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WHEN THE WIND BLOWS VIOLENTLY AGAINST THE WIRE

Wind-tossed branches inflict severe and costly punishment on wires. But the improved Hazard Armored Tree Wire is built to beat the wind. Even if the outer braid of hard laid seine twine is rubbed through, the spirally wound non-metallic armor tape so remarkably resists further wear as to effectively protect the insulated conductor.

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ELECTRICAL WORLD

for the Week Ending

December 13, 1930

The most striking phenomenon of our time is the multiplication of the carrying power of the human voice and the appeal to the minds and the emotions through the human ear . . . a world so small that many radio waves have to be sent the long way round in order that they may be heard at all. This little globe of ours has become too small to handle most effectively our own developed agencies of communication.

OWEN D. YOUNG,
Chairman of the Board
General Electric Company.

Hoover's power board nominations face Senate fight

Raising of capital biggest problem, says Floyd Carlisle

—**Arkwright at Trade hearing** defends Georgia Power Company policies, disclaiming allegedly unfair practices and citing benefits realized by communities. Thus another federal investigation is completed—*pp. 1069, 1103.*

—**Floyd L. Carlisle looks ahead** to financing problems of the next few years. "The real question confronting the industry today is: Can they, in the future, secure this capital as in the past?" avers Niagara-Hudson chief—*p. 1079.*

—**Security prices again slump.** Utility bonds, on average 3.9 per cent yield basis at midyear, now touch 5 per cent. Stock prices are one-third of top figures in roaring boom times—*p. 1103.*

—**75-kw. three-conductor cable** makes its bow. Cincinnati utility applies oil-filled installation in trench construction, utilizing several innovations to insure best operating results—*p. 1088.*

—**Radio interference a problem** on the West Coast. Association asks N.E.L.A. to secure manufacturer co-operation to produce appliances with "non-radio-interfering" characteristics—*p. 1069.*

—**Hydro outages third of steam,** reports N.E.L.A. hydraulic power committee, showing outage times of 3.52 per cent and 9.69 per cent respectively in 1928. A kind word where badly needed—*p. 1099.*

—**Cut in Minnesota hydro costs** looms as power commission disallows various sums totaling $1,569,249. This represents a slash of 41 per cent in costs of Blanchard Rapids project—*p. 1072.*

—**Silent substations developed.** Louisville Gas & Electric, to complete the idea of a substation which will be an all-around good neighbor, adds noiselessness to attractive appearance—*p. 1093.*

NEWS OF THE WEEK

Strife Manifests Itself Over Personnel of Federal Power Board

A BATTLE in the Senate over the composition of the reorganized Federal Power Commission is impending as the result of opposition to the confirmation of at least three of the five presidential nominees. Governor Huey Long of Louisiana, who will represent his state in the Senate in the next Congress, is attacking the selection of Marcel Garsaud of New Orleans, whose name was sent to the Senate by President Hoover before it adjourned last July. Mr. Long's reasons for opposing Mr. Garsaud's confirmation have not been made very clear to the public, but he is quoted as saying: "The almost indistinguishable connections of Mr. Garsaud must have required an inspired genius to have slipped his name to the President. Louisiana isn't looking for any jobs that would mean an imposition on the nation."

Opposition, not of a violent nature, has been expressed to the selection of George Otis Smith, designated as chairman with a five-year term. The assumption seems to be that Mr. Smith's tendency would be to view issues through public utility or administration glasses, though no specific reasons for such a belief have been published.

The strongest opposition, however, is against the appointment of Frank R. NcNinch of North Carolina. He is attacked on political grounds as a leading supporter of Mr. Hoover in the 1928 campaign and therefore not properly a Democrat, of whom there must be two on the commission. It is also said that he rendered no accounting of the expenditure of funds by him in the campaign referred to and that among the contributors there are believed to have been utility interests. Mr. McNinch denies vigorously that he has ever "been associated with any power company in any capacity, private or professional," or owned power-company stock.

In addition to reflections on the nominees, an attack is being made against F. E. Bonner, the commission's executive secretary, and at least one member of the interstate commerce committee, to which the nominations were referred, is reported to have gone so far as to express a desire to obtain from the nominees, who were to appear before the committee in an inquiry scheduled to begin on Thursday of this week, promises that Mr. Bonner's retirement will be insisted on. This attitude has evoked criticism both as a high-handed attempt by these senators to dictate the commission's policy and as an unwarranted assault on Mr. Bonner. The latter emphatically denies specific allegations to the effect that he withheld information from the Attorney-General in the New River case and also caused the omission of facts from the commission's annual report.

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Compromise Now Possible on Muscle Shoals Bill

SENATOR NORRIS OF NEBRASKA, who has been standing uncompromisingly for an out-and-out experiment in public operation of an electric power project based on Muscle Shoals, showed some signs of yielding at a meeting of the conferees December 9. He had already made known his willingness to allow the House conferees to write their own fertilizer clause, but on Tuesday he went even further and seemed to be willing to surrender the provision in the Senate bill which authorizes the government to construct distribution lines. The House conferees, in turn, have announced their willingness to allow the Federal Power Commission to fix the rates to be charged for the electricity. Heretofore they have insisted that this authority should not be taken away from the states concerned.

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FLOODLIGHTS SAVE DAY FOR "LEVIATHAN"

Overhauling the SS. "Leviathan," in dry dock at Boston, was speeded up recently by an installation of G.E. floodlights, which enabled the ship to leave with the 4 o'clock morning tide rather than at 3 o'clock the following afternoon, bringing a saving of between $15,000 and $20,000.

Senator Norris is firm in his belief that fertilizers and chemicals can be manufactured to better advantage at certain places other than Muscle Shoals. He is apparently convinced that the farmers of the country will benefit more if fertilizer production at Muscle Shoals is confined to experiments. It is apparent, however, that a large number of House members will oppose any bill that does not provide for the production of fertilizer on a commercial scale. For this reason Senator Norris is willing to yield on that point.

At the end of the conference the conferees felt that the chances of getting an agreement on Muscle Shoals were better than at any previous time. A tentative decision to report disagreement had at one time been reached.

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Hurley Tells About Shoals Energy and Alabama Power

RESPONDING TO A RESOLUTION of Senator Howell of Nebraska which was adopted by the Upper House at the last session of Congress, Patrick Hurley, Secretary of War, has sent to the Vice-President a letter, just made public, in which he says in reference to the War Department's contract with the Alabama Power Company that the latter agreed to utilize "the available hydro power at Wilson Dam to a maximum in replacement of steam" and agreed not to "operate its steam plants when Wilson hydro power is available, except as may be necessary for voltage regulation, protection of its customers and in case of breakdowns or line interruptions." Primary power available at Wilson Dam amounts to 66,000 kw., the War Secretary reports.

Through the agreement with the company, the federal government has maintained a gross return of $18.77 per kilowatt-year during the last four years, according to the letter. While Secretary Hurley considers that the agreement with the Alabama Power Company is satisfactory, he says that it does not constitute a permanent solution of the Muscle Shoals question.

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N.E.L.A. Asked to Act on Radio Interference

DECLARING THAT RADIO interference caused by domestic electrical appliances is assuming a constantly increasing importance and will, if not mitigated, restrict the sale and use of such appliances, the directors of the Pacific Coast Electrical Association recently passed a resolution recommending that series-motor-driven and thermostatically controlled appliances and any others causing radio interference be equipped with proper filters or condensers and have such words as "Non-radio-interfering" stamped on the nameplate. The National Electric Light Association is asked in the resolution to take the matter up with the National Electrical Manufacturers' Association and obtain its cooperation and also to request the geographic sections of the N.E.L.A. to make similar suggestions to manufacturers in their respective territories.

MARCH OF PROGRESS IN THE OZARKS

—Wide World Photos

Bagnell Dam, directly across the Osage River, will form a 60,000-acre lake and add 210,000 hp. to the resources of the Union Electric Light & Power Company, St. Louis. Linn Creek, county town, long a determined antagonist, has given up the fight and will remove four miles south before the old town is obliterated by a man-made flood.

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President Sees New York's St. Lawrence Commission

MEMBERS OF THE St. Lawrence Power Development Commission of New York called upon President Hoover and other government officials on December 4 to formulate plans for cooperation between the federal and state governments in the forthcoming negotiations with Canada on the development of power in the international section of the St Lawrence River. The delegation comprised Robert Murray Haig, the chairman; Julius Henry Cohen, Thomas F. Conway, Frederick M. Davenport and Samuel L. Fuller.

"We told the President of our desire to avoid any possibility of conflict between the interests of the State of New York and those of the federal government," Mr. Haig said. "We believe that it is entirely possible to accomplish this result. We are confident that the plans devised by our engineering board will commend themselves to both the United States and the Canadian government." Mr. Haig thought that the former association of General Jadwin, now chairman of the New Yorkers' engineering board, with the international plan would help materially in the negotiations.

The commissioners conferred also with Under-Secretary of State Joseph Cotton, with F. E. Bonner, executive secretary of the Federal Power Commission, and with members of the Senate committee on foreign affairs. The New York commission is planning to report progress on January 15.

Premier Bennett of Canada, who has returned to Ottawa from London, is reported as ready to look into the St. Lawrence situation from the Dominion point of view.

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P. S. Arkwright Defends Southeastern Mergers

THE CLOSING TWO DAYS of hearing before the Federal Trade Commission on the affairs of the Georgia Power Company, its predecessors and parent companies were devoted to two types of testimony which differed very widely.

On one day press agents and legislative agents of the company and editors of Georgia papers told of the mechanism of supplying the newspapers with materials for the news and editorial columns. Correspondence was read into the record in an effort to show that attempts were made to influence the publishers even to the extent of withholding advertising if their editorial and news treatment of utility matters was not favorable to the company. This the company disclaimed. A letter was read which said: "We can see no reason for discontinuing our advertising . . . I don't see how we could expect to acquaint our customers with the service and appliances we have to offer except through this medium. Advertising copy is not placed for the purpose of influencing any editor in his opinion toward the industry. The advertising is for the purpose of creating and maintaining good will and increasing the sale of appliances."

On the following day President Preston S. Arkwright presented an extended justification of the Southeastern consolidations and the realignment of book values. From the physical standpoint two factors were cited—one the diversity of rainfall in the Alabama and Georgia watersheds, the other the load diversity created by the Eastern and Central time schedules in the two areas. From the financial standpoint, underlying bonds were supplanted by preferred and common stocks, and the company, according to the testimony, was placed in a much more advantageous position for further expansion and financing. Engineering talent and management skill have greatly improved service and reduced rates $2,000,000 in 1930 alone, Mr. Arkwright said. A fuller report of Mr. Arkwright's contentions will be found on page 1103.

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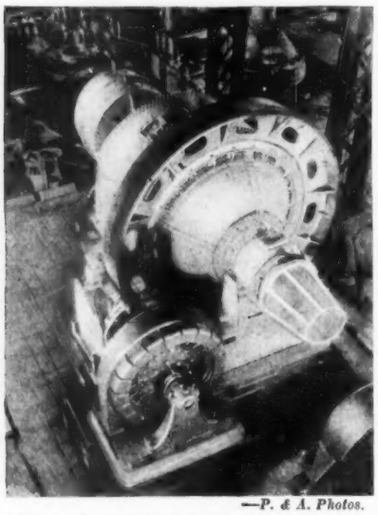
400-HP. MOTOR RUNS ORE SEPARATOR



—P. & A. Photos.

Operation of this huge, whirling machine to separate ore from metal at a Flin Flon (Manitoba) smelting plant is made possible by a Canadian G.E. motor

New Hampshire Quiz May Be Transferred to Court

UTILITY WITNESSES presented further testimony last week in the inquiry before the Public Service Commission at Concord to the effect that rate reductions for New Hampshire consumers resulted from operation of the New Hampshire Gas & Electric Company of Portsmouth and the Derry Electric Company as units of the Associated Gas & Electric system.

Raymond C. L. Greer, general manager of the New Hampshire Gas & Electric Company, told the commission that Associated Gas & Electric rate experts were engaged in a survey of existing rates in both local companies' territory. On recommendation of one engineering-company specialist, he said, in explaining benefits received, a new type of coal is being used in the Portsmouth steam plant which is saving the company 60 cents per ton on the cost of the fuel, or from $18,000 to $24,000 a year. He declared the services rendered by the J. G. White, Barstow and Utilities Purchasing & Supplies corporation as of great value to the operating companies.

State Counsel Wyman asked whether the New Hampshire utilities would disclose amounts paid for certain subsidiary companies by those who in turn transferred them to the New Hampshire utilities. Counsel for the companies answered that the corporations "did not consider the inquiry as material" and further that "we have no legal means of obtaining the information." Commissioner Morse, presiding, interpreted the answer as a refusal to furnish the information.

A suggestion from the utilities' counsel that the moot points in the investigation be transferred directly to the Supreme Court of New Hampshire was made. The commission can, however, if it chooses, make findings of fact and base orders upon them, subject to appeal, or can ask the United States District Court to modify or dissolve its injunction, which prevented the commission from inquiring into certain phases of the Associated Gas & Electric system affairs in which it manifested interest.

Either one of these courses of action, or both, even if initiated first, would still leave the way open for transfer of questions of law direct to the Supreme Court of New Hampshire.

Irish Free State Issues Shannon Postage Stamp

HEREWITH are shown two of an issue of twopenny stamps very recently authorized by the Irish Free State government to commemorate the completion of the Shannon River power project. The stamp, of which there is only one issue in this denomination, represents the dam across the Shannon at Parteen Villa, where the water is diverted into the headrace which flows to the power station, 7½ miles further on at Ardnacrusha. The lettering on the stamps is in the Irish language, the word "Eire," on the top, meaning, of course, "Ireland" and the words underneath meaning "Shannon Power Development, 1930." The diagonal white line across the stamps has been drawn to comply with United States postal regulations regarding the reproduction of foreign stamps.

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Associated Gas and Insull in Transfer of Properties

ANNOUNCEMENT IS MADE that the Pennsylvania Electric Company, subsidiary of the Associated Gas & Electric Company, has acquired from the Insull interests an isolated group of properties in Pennsylvania formerly controlled by the Penn Central Light & Power Company, subsidiary of the National Electric Power Company. At the same time the Associated Gas sold to the Insull interests all its holdings in the Hydro-Electric Development Syndicate, whose property is in New Hampshire, and certain minority interests in the New Hampshire-Vermont Power Company and the New Hampshire Power Company, the three companies composing a group of central New Hampshire properties.

The systems acquired by the Associated system in Pennsylvania were separated from the other properties of the Penn Central company and purchased power from the Pennsylvania Electric Company to serve their customers. The Pennsylvania Public Service Commission has approved their sale.

Klamath River Permit Awaits Legislation

IF AND WHEN OREGON enacts legislation to guarantee that any future appropriation of the waters of the Klamath River will not interfere with the needs of reclamation and irrigation projects, the Reclamation Commission of that state may grant permission to the California-Oregon Power Company to use the waters in question for establishing hydro-electric plants. This, in effect, is the opinion of the State Attorney-General in reply to a request of the Governor for legal instruction as to the Reclamation Commission's jurisdiction over 1,500 sec.-ft. of water ceded to the federal government and now held in trust for irrigation purposes.

If the Oregon Reclamation Commission declines to exercise jurisdiction in the matter of the applications of the California-Oregon Power Company, officials of the company announce that the proposed construction will be merely transferred across the line and the development of the projects completed in California territory. The utility's present program for Oregon calls for the establishment of five units along Klamath River from the Grant power site to the state line, a distance of 15 miles. Governor Norblad, who favors the applications, intends to order another hearing at which the board may seek additional facts relative to its powers and, if possible, render a final decision.

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Oregon Cities Want Hydro Power from Deschutes

FIVE SEPARATE APPLICATIONS for as many permits to appropriate water from the Deschutes River for the purpose of developing 212,161 theoretical horsepower have been filed with the State Engineer of Oregon by municipal authorities of Portland with the construction of publicly owned and operated hydro-electric plants in view. The projects cover five dams ranging from 63 ft. to 118 ft. in height and designed to develop from 33,000 hp. to 57,000 hp. apiece at a total cost of about $18,000,000.

The city engineer of The Dalles filed application on behalf of that city for permits to appropriate 9,000 sec.-ft. of water from the same river for the purpose of developing 85,000 hp. The Dalles application is probably the first step looking to the creation of a power district under the constitutional amendment approved by the people last month. Should The Dalles meet with success in its move, the operations of at least five private utilities now rendering service in that territory may be affected directly or indirectly. In the operating fields which would be directly affected are the Pacific Power & Light Company, the West Coast Power Company and the Maupin Electric Company. Fields which would eventually be included in the district, according to the tentative plans, are now occupied by the Prairie City Light & Power Company (a West Coast property), the Eastern Oregon Light & Power Company, and the Oregon system of the Idaho Power Company.

▼

Arizona City May Give Up Public Ownership

JANUARY 6, 1931, HAS BEEN SET by the City Council of Glendale, Ariz., as the date for a special election on granting a franchise to the Central Arizona Light & Power Company, Phoenix. This action follows negotiations for months between the power company and the City Council to agree upon a plan whereby the power company would take over the publicly owned Glendale system and furnish electricity to the municipality. The price named is $287,500.

Cheapest Supply Source Is Criterion for Rates

WHERE SEVERAL SOURCES of electric supply are available to a city the utility may utilize any one, but the rates charged must be based on the cheapest source of supply. This is in effect the ruling of the Alabama Public Service Commission in what is known as the Frisco City case. The question arose when the Alabama Utilities Company sought to build a 40-mile transmission line from its River Falls hydro-electric project to serve Frisco City, Excel and Repton. The Alabama Power Company protested that it could supply power at wholesale to the Alabama Utilities Company from its line within 17 miles of Frisco City cheaper than the latter company could build a line.

The state board granted a permit to the Alabama Utilities, but with the proviso that rates must be the same as could be profitably prescribed should power be purchased wholesale from the Alabama Power Company. The petitioning company protested that it would be unable to abide by the rates pre-

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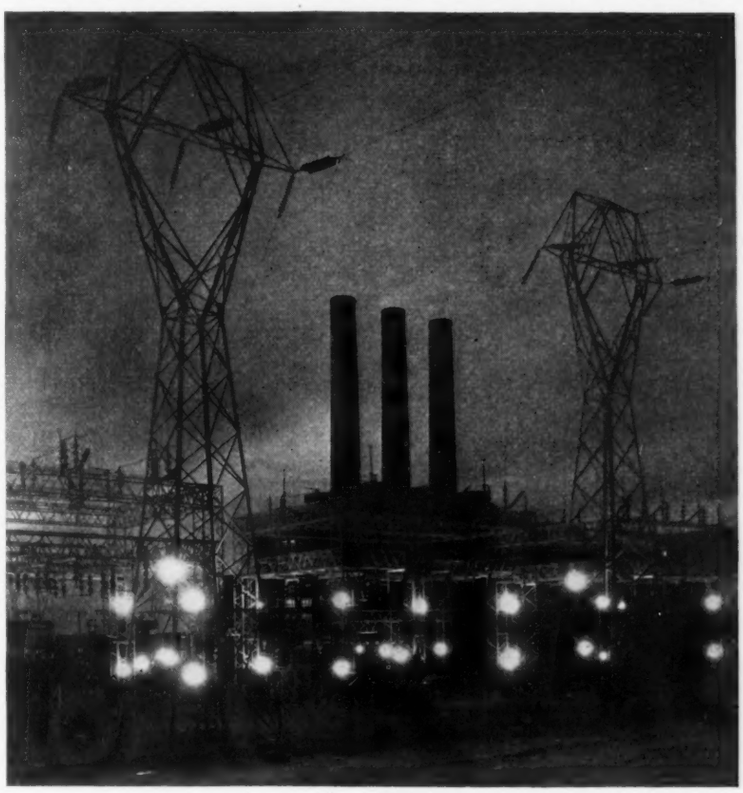
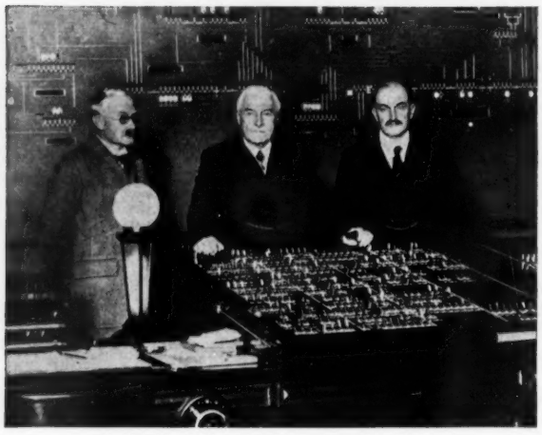
ASHTABULA PLANT RESPLENDENT AT NIGHT



The first 50,000-kw. unit of the Cleveland Electric Illuminating Company's new power plant at Ashtabula, Ohio, has gone into operation. The second and third units are nearing completion. The plant will have an initial capacity of 150,000 kw. and an ultimate rating of approximately 400,000 kw., with eight units.

GREAT BRITAIN NOW HAS 66,000-VOLT SUBMARINE CABLE



—International News Reel Photos.

Buried 35 ft. beneath the Thames, cables capable of carrying 66,000 volts are laid in a tunnel from the new Battersea power station to the metropolitan area of London. Dr. S. L. Pearce, engineer-in-chief of the London Power Company, is shown on the extreme left, with Manager Fladgate of Battersea station (center) and the manager of the works. On the right Dr. Pearce leads a party through the tunnel.

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scribed and asked permission to install oil engines at Frisco City. The board granted this request, but under the same rate conditions. The company submitted its own rate schedule, which was not accepted by the board. Now the company has notified the commission that it will be unable to serve the city by oil engines, but has not indicated its next move in the case.

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No Injunction Against Tacoma's City Plant

INJUNCTION PROCEEDINGS brought in the Superior Court at Tacoma, Wash., in the name of two Indians to prevent the city from operating the second unit of its Cushman power plant were fruitless, the court declaring that the plaintiffs had not acted with due diligence, that the threatened damage to their property was inconsequential in comparison with the city's great investment and that alleged "fear and apprehension" by the Indians was not well grounded. The action will be prosecuted further, the plaintiffs' attorneys said.

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Would Slash Minnesota Costs 41 per Cent

ELIMINATION OF $1,569,249 from the $3,801,342 shown by books of the Minnesota Power & Light Company as its investment in the Blanchard Rapids power project on the Mississippi River, near Royalton, Minn., is proposed in a report just filed with the Federal Power Commission by its accounting division. The company may file a protest against the elimination within 30 days, whereupon a hearing will be called.

Among amounts disallowed are: Profit to Pike Rapids Power Company, original licensee, $206,768; discount on sale of Pike Rapids notes, $338,400; contractors' profit in building Blanchard Rapids plant, $306,920; profit to Phoenix Utility Company for supervision, $92,290; engineering salaries, Electric Bond & Share Company, $127,688; excess value of lands acquired, $194,654.

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Broad River Case up Again in Supreme Court

POWER OF A STATE to compel a public utility with more than one department to supply service under one phase of its franchise at a financial loss and tax its expense against the more profitable lines of its business, involved in the case of Broad River Power Company vs. State of South Carolina, was argued for the second time before the Supreme Court of the United States on December 3 and 4. (ELECTRICAL WORLD, May 24, page 1015.) It involves the right of South Carolina to require the petitioning company to resume permanent operation of the street-railway system in Columbia, S. C., operation of which was abandoned in 1927 because during the preceding seven years it had been run at an annual operating loss. The decision of the United States Supreme Court in May upheld the State Supreme Court in declaring the services non-separable and ordering resumption of railway service.

"Grid" Power Contracts Reach $100,000,000

APART FROM NORTH SCOTLAND, where a small and scattered population makes interconnection plans on a large scale impracticable, and south Scotland, where success hinges on linking small water-power plants with steam stations at Carlisle and Glasgow, the sectional schemes for the electrical reorganization of Great Britain have now all been approved. Some of the lines are already energized, and contracts to the amount of nearly $100,000,000 have been placed by the Central Board for overhead lines, cables, substations and other equipment.

Little construction has been done in the southwest and eastern areas of England, for which schemes were not adopted until this year, and in southeast England it has proved difficult to obtain rights-of-way, especially in the neighborhood of London. Farmers are reported reluctant to grant them, and this has retarded progress.

Work will begin soon on 500-ft. towers to carry conductors across the Thames at Woolwich, London. A 30,000-kw. turbo-generator has gone into operation in Canning Town, a London suburb, and the power station there will become a "selected" station in the scheme of the Central Electricity Board. The West Ham Council, controlling this station, will lay mains in every street of the borough—a total of 140 miles, of which 80 miles has already been laid. Concrete posts erected from Brighton to Worthing, in the South Downs district of England, have provoked both engineering and esthetic criticism.

Submetering Interests Fight Hard in New York

COUNSEL FOR THE New York Edison Company appeared before the Board of Estimate of New York City last week to oppose an application for a franchise by an independent company, the Spingler Electric Corporation, to supply electricity in the Union Square section of Manhattan. Mayor Walker encouraged the Spingler company's counsel to inquire into proposed rates and then elaborate his application.

The bid for the franchise was held to be an outcome of the submetering situation. That situation led Clarence J. Shearn, counsel for the Real Estate Board of the city, to attack the New York Edison Company vigorously before the Public Service Commission of the state when that body last week resumed its hearings upon the company's proposed new rate tariff. Mr. Shearn said that, in view of the company's previous policy of inviting building owners to enter into contracts with it and throw out their own plants, its present endeavor to end submetering was "absolutely dishonest." Judge Ransom, the company's counsel, dissented emphatically and spoke about the real estate men's "illicit and improper profits." A rate structure eliminating the demand charge to commercial customers and reducing the 60-cent service charge to 30 cents was offered by submetering interests as a substitute for the Edison proposals. This plan, it was contended, would bring a uniform rate to all retail customers, reduce the bills of 50 per cent, increase no bills more than 30 cents a month, avoid complaints, simplify customer classification and obviate an expenditure of $10,000,000 by building owners for installing demand-charge meters.

The energy charge under the substitute plan would be 6 cents a kilowatt-hour for the first 1,000 kw.-hr., 5 cents for the next 2,000 and 4 cents for all in excess of 3,000 kw.-hr. The estimated revenue would be almost identical with that under the company's plan.

The commission hearing will be resumed on December 18. The Spingler company's franchise application to the Board of Estimate was laid over till January 16.

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St. Louis Would Knock $1,000,000 from Rates

REDUCTION of $1,000,000, or approximately 25 per cent, in the Union Electric Light & Power Company's domestic rates in St. Louis was asked of the Missouri Public Service Commission in a statement filed by city counsel when the commission resumed its inquiry last week. R. M. Boyles, a consulting engineer for the city, said that his study of the property and the audit made by the accountants of the commission convinced him that the present fair value of the company's property used in the city area does not exceed $40,000,000.

A fair return to the company, he said, would be between 7 and 8 per cent. Seven per cent would give the company a return of $2,800,000 on a valuation of $40,000,000. The valuation placed by the city on the St. Louis property of the company, he declared, is conservative.

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Coming Meetings

Pacific Coast Electrical Association—Commercial Section, Los Angeles, Jan. 8-9. S. H. Taylor, 447 Sutter St., San Francisco.

American Engineering Council — Annual meeting, Washington, D. C., Jan. 15-17. L. W. Wallace, 26 Jackson Place, Washington.

National Electrical Manufacturers' Association — Midwinter meeting, New York headquarters, Jan. 19-23. A. W. Berresford, 420 Lexington Ave., New York.

American Institute of Electrical Engineers — Winter convention, New York, Jan. 26-30; district meeting, Pittsburgh, March 9-13. F. L. Hutchinson,, 33 W. 39th St., New York.

North Central Division, N.E.L.A.—Commercial meeting, Nicollet Hotel, Minneapolis, Jan. 26 and 27; engineering meeting, Minneapolis, Feb. 23 and 24. J. W. Lapham, 803 Plymouth Bldg., Minneapolis.

Midwest Power Engineering Conference—Chicago, Feb. 10-13. G. E. Pfisterer, 308 W. Washington St., Chicago.

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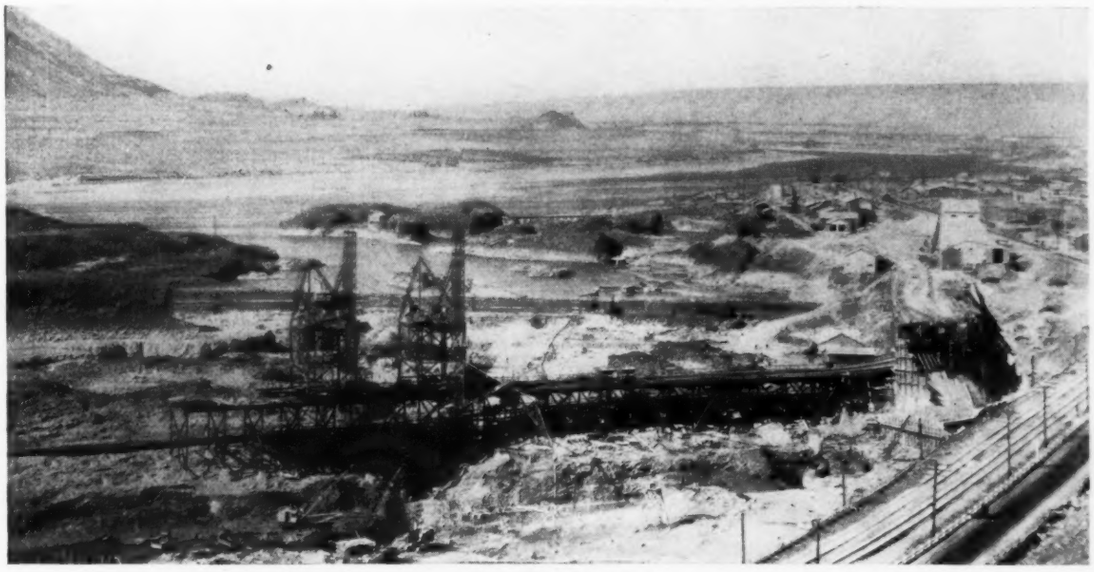
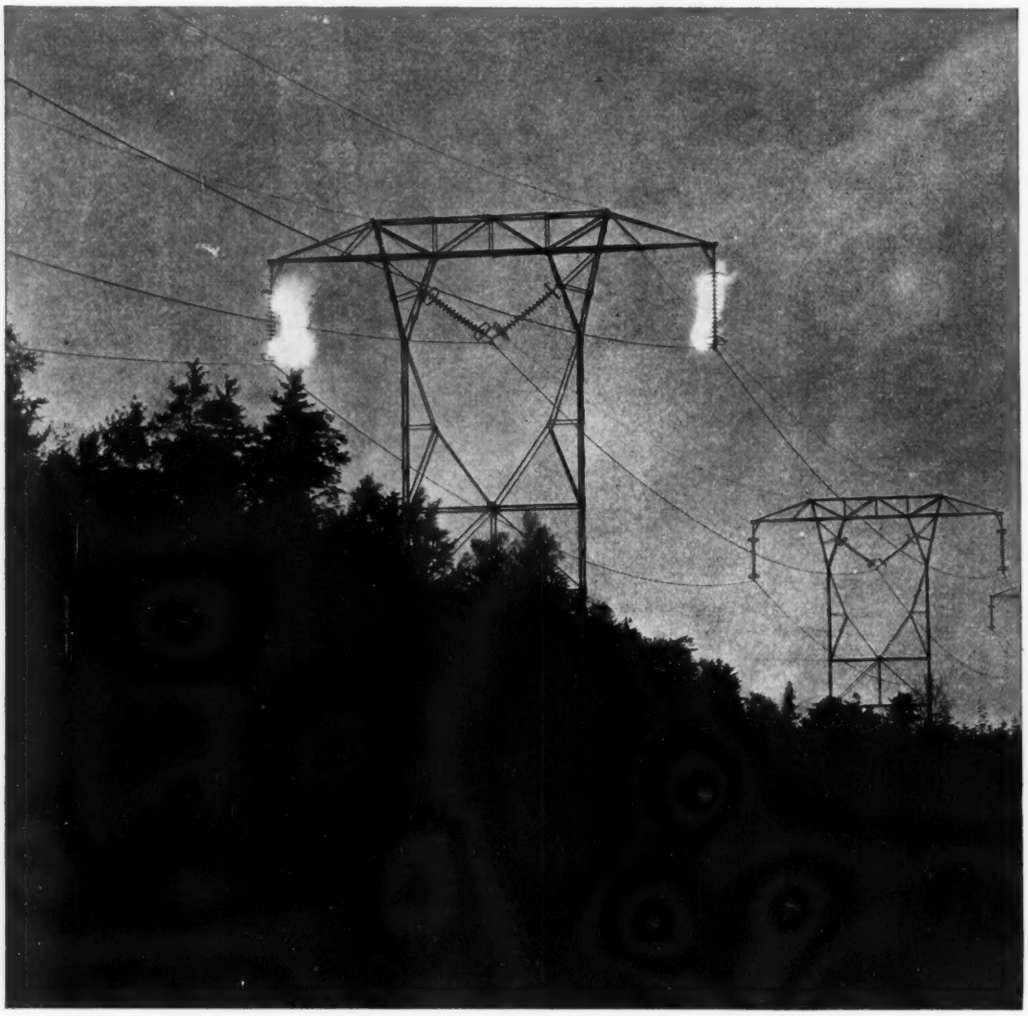
PUGET SOUND POWER & LIGHT HARNESSES THE COLUMBIA



On the site of the 40,000-hp. Rock Island development on the Columbia River, below Wenatchee, Wash., two timber-crib cofferdams have been completed to permit dewatering of the east channel by diverting the water around the island and through the west channel. The dam and power house will be immediately in front of the temporary concreting trestlework in the foreground. Initial generating capacity will approximate 80,000 hp.

585,000-Kva. Test Short Cleared in 8 Cycles



Tests made with high-speed 220-kv. breakers on the New England Power Association's new line developed opening speeds of the order of 8 cycles. Higher breaker speeds are indicated with more normal system conditions. In the two-phases-to-ground short shown, 585,000 kva. was feeding in and about 800 amp. was broken per arc.

EDITORIALS

L.W.W.MORROW
Editor

Open covenants openly made

THE mechanism of reconciling book values with actual values and the methods employed in acquiring properties for consolidation constitute the major portion of the Federal Trade Commission's research into utility financing and aggregation. Through all the testimony runs a tone and temper which indicate that the commission would like to ascertain for the edification of the Senate just how ethical the directors and banker promoters have been during the era of mergers and unification. At times it even appears that the inquisitive senators might have relished official governmental representation on the utility directorates.

Much of what disturbs public thinking and promotes agitation originates in utility board actions which take engineering and financial proposals for expansion and consolidation and execute them. Right at this point focus all the factors that account for disparity of appraisals, purchase prices, security issues and book values.

In order to remove the incubus of doubt that surrounds write-ups, surpluses, stock dividends and so forth when they arise as specters in rate and security issue cases, it does not seem necessary to provide legislation enabling commissioners to sit as members *ex officio* of utility boards. All that they could learn of the economic exigencies which underlie corporate utility values and financing and becloud rate regulation can be acquired through their present administrative and investigative powers, and this information should be given them willingly by the utilities.

At this point a heavy responsibility rests on the utility industry. Every consolidation or expansion move in the past should have been laid comprehensively before the commission while it was being negotiated and consummated. Every move in the future should be as fully exposed as a set of trial hands in bridge whist, for north, east, south and west to analyze. Then when the hands are played every participant will know that it is a legal deck and an honest deal with only the immutable laws of chance (or economics) determining the number of tricks taken or missed. Latent and lingering public inability to grasp the bearing of financing upon rates would gradually vanish if the commissioners could and would in part view the problem from the directors' angle and then pass that perspective on to the other party, the consuming public.

Building the industry

THE electrical industry has been built upon individual initiative. It has never had a policy of contentment. As it grows larger, however, with large organizations and decentralized responsibilities, there is a tendency to maintain old standards, use old materials and equipment, continue existing operations and become satisfied to "get by" with conditions as they exist. Increase in size, centralized ownership and centralized responsibility make it possible in many cases for a subordinate to get credit for mere routine work without mistakes as contrasted with the exercise of his initiative and courage to gamble a little on his ability to improve a given situation. To make a suggestion for a change involves red tape, a wrangle with others and a disturbance in organization routine, and the penalty for a mistake often exceeds the reward for an improvement. The result is a *laissez faire* tendency that is not conducive to progress.

It is difficult to prevent this trend and to set up methods for acting upon suggestions of subordinates. Many of the suggestions are not worth while; all of them disturb routine operations and take the time of busy men for their study and decision. Yet initiative and improvements should be encouraged. A possible method in large enterprises is to set up a staff organization whose sole duty is to study this element. It is a part of personnel work that should be developed.

An era of health by lighting

THE first extensive installation of dual-purpose lighting has been completed. It was described in last week's issue by Dr. Luckiesh, who has done so much to encompass the safe and beneficial application of ultraviolet radiation. This example of space illumination inaugurates a new era of lighting and carries with it a new criterion of lighting values. Henceforth all interior lighting can be measured in terms of its approach to the health-sustaining properties of the sun which warms us, vitalizes us and supplies our plant and animal foods with activating ultraviolet vibrations.

It is wholly practicable to design these dual-purpose installations with the proper amount of light for vision and with an intensity of ultraviolet radiation which will cause no harm over a period of several hours. In those cases where persons are exposed for only a short time it is necessary to be cautious both in the design of the installation and in regulating exposure to it, because if sufficient ultraviolet radiation is available to supply the proper dosage in a fraction of an hour, harmful effects might result were any one exposed to it for five or ten hours.

If eventually the design of dual-purpose lighting is standardized to provide a minimum dosage equivalent to one-tenth that which produces barely perceptible erythema on untanned skin, it is obvious that ten times this exposure would not produce a visible erythema upon the areas of skin ordinarily exposed under artificial light. Furthermore, several times the dosage required to produce a minimum perceptible erythema upon the skin ordinarily exposed will not result in a harmful burn, although in some cases it may be painful. It appears that there is available a factor of safety between ten and, say, twenty-five.

Artificial indoor sunlighting is the illuminating engineer's next program. It is his contribution to man's emancipation from his deprivation of the sun's health-giving rays; it is civilization's antidote for devitalizing confinement, a recovery of aboriginal amenities. The risk in the program is that zeal unsupported by expert knowledge may lead to installations that will occasion momentary setbacks if erythemal bounds are exceeded in conjunction with long exposures.

Engineering help on unemployment

MANY who are not even now optimists can see good issuing from the dark despond that enshrouds business today. Not the least of these is the determined effort to analyze the economic and psychologic origin of it and the evolving organization to terminate it and, if possible, prevent its recurrence.

One isolated but promising element is the contribution of the mechanical engineers, through their vigorous response to Colonel Woods' plea that engineers make a nation-wide survey of the unemployment situation. The engineering representative of an engineering President has started something which should be extremely fruitful in re-establishing and stabilizing employment, and even in the resumption of the consumption that supports production and employment.

Engineers sit at the throttle of much of industry, productive, constructive and consumptive. Other engineers should volunteer at once to aid the effort of the mechanicals. The electrical engineering sections, not waiting for the annual meeting of their Institute next month, could individually act to bolster the survey already promised. During the survey itself, even if it is primarily aimed only at mere factual disclosure, opportunities will be revealed where advantageous moves can be made in the manufacturing, utility and construction fields to inspire confidence, promote courageous ventures and thus accelerate consumption, production and employment.

Economical regulation of interconnection

AN AUTOMATIC operator maintains most economical distribution of load between three units totaling 62,000 kilowatts at the Norwood (N. C.) hydro-electric station. The results have convincingly demonstrated the appreciable saving possible through scientific allocation of load.

Considering the accomplishment on three units and 60,000 kilowatts of hydro capacity, it is interesting to think of the possibilities in the present large interconnected groups of one to two hundred units and more than 1,000,000 kilowatts capacity. Efforts at the most economical load distribution on such an interconnection should pay handsomely.

However, it is extremely difficult to expand such an automatic operator to control more than a hundred units scattered through twenty-five stations, with the distance between stations running from five to one hundred miles. Then, just to make the problem interesting, it may be that there are not only steam and hydro stations, but that the hydro stations are on entirely different watersheds—some being strictly run-of-river with no storage, some having varying degrees of storage, some being intended solely as storage plants and some merely as pumping installations.

How can the system load be transmitted to a totalizer? How can the proportional control for most economical load distribution be returned to the stations and their respective generators? Must a mass of pilot wiring be used with boosters, repeaters and what not, or can radio or possibly carrier frequency do the trick? Communication is essential. Possibly the wizards of the communication field who apparently consider no difficulty insurmountable can provide reasonably priced communication circuits over which varying frequencies, or something of the sort, may carry the load information and the economical regulating control.

Even assuming that the load is most economically distributed, provision has not been made for regulating the frequency of the systems. After all, who knows how closely there is need to regulate this frequency? And even before this, who knows how much variation would occur if no regulating were done? Verily, there still seem to be some common ordinary operating problems to be solved in the rational operation of interconnected systems.

Transition stage—a crucial period in public relations

ABSORPTION in engineering, commercial and financial problems should not divert the attention of light and power companies from local public relations during a transition period of major corporate changes. In some cases new managements have failed to "sell themselves" to local communities for years after acquiring properties because pains were not taken to inform the public fully and in a personal way as to the new plans and policies. Distant executives have remained distant, so far as any popular points of contact go, and sometimes even local managers have been left too long in the dark.

Too frequently hard-pressed officials at holding-company headquarters seem to think that so long as the previous local manager continues at his post all will be well with public sentiment. Obviously, local managers can do much to make or mar the reputation of the incoming organization, but if higher executives from without stay away too long or make mainly one-day visits, all manner of misconceptions may circulate.

Neglect of public contacts at such times tends to create prejudice, perhaps entirely unwarranted, against the new organization. Much of it could be forestalled if executives would take the time to visit properties more frequently in person during the days of changeover, meeting customers, attending service organization luncheons and devoting at least a few hours now and then to promoting friendly acquaintance.

Acquiring a new property is different from buying a mass of machinery and bulk merchandise. Men are more than machines, and the development of corporate personalities should not be left to chance and convenience. Slips that occur during changeovers will be overlooked where customers can visualize personalities. Frankness will be met with friendly acceptance, and credit will be given for constructive work. The oppor-

tunity to build deep foundations of popular regard is never greater than during the early stages of major corporate changes and particularly when the managerial functions pass into new hands.

Increment costs favor network

EVERY company at one time or another is faced with the situation that further load increases in some districts cannot be handled without major expenditures for substation additions, transmission lines, new feeders or supplementary secondary mains. If the load increase in that district has been rapid and has prospects of continuing, then is the time to consider seriously the installation of an alternating-current network instead of perpetuating the high increment costs of periodic additions to a radial distribution system. A high load density does not have to prevail to warrant a network. It is the rate of load growth which brings out its advantages.

Any utility that hesitates to make the initial investment might be interested in the fact that one company has found the first cost of a network supplied from high-tension feeders 10 per cent less than that of a radial system for the same load area. Considering annual losses, the annual charges were found to be 25 per cent less. Without allowing for equipment that could be retained from the old system or used elsewhere, a network would thus pay for itself in four years.

If a company has been planning for a network by installing large enough secondary mains and transformer vaults and manholes, the investment in these and their duct systems can be saved in the conversion by merely interconnecting the mains. Considerable substation and distribution equipment displaced by the conversion can be used in other districts until they too are converted. Sometimes the transmission lines feeding substations can be extended to feed the network. Besides, substation sites can frequently be released at a profit. These and other savings can be made to minimize the initial cost of the network, which, as already pointed out, shows in many instances an annual saving of 25 per cent over the radial system without such considerations.

Structural welding gains

PRECEDENTS which have been hampering the building industry for years are gradually giving way. Welding of building structures is gaining acceptance. Five cities, including New Orleans, allow it when performed according to the American Welding Society code, and 88 other cities have adopted a similar code. According to a questionnaire sent out by the society, four concerns alone have used welding in constructing 91 buildings, involving thousands of tons of steel. Even bridges are being welded.

As much as 7 per cent in steel has been saved by welding owing just to the fact that the cross-section does not have to be increased to offset rivet holes. Because gussets are not so essential to welded trusses as riveted types, 14 per cent reduction in steel has often been effected from this cause alone. Furthermore, no slip occurs in welded joints, as may happen with riveted ones, and of course the irritating din of rivet hammers is avoided.

With these advantages of welding there is no logical reason why it should not be adopted more widely for building structures, provided that safety is assured. To this factor major consideration has been given by the group which formulated the American Welding Society code and which knows that any failure of welded structures will be a "black eye" to further extension of this practice. Its specifications of allowable welding materials, design details, permissible unit stresses are all aimed to assure adequate safety factor. But it goes further by requiring the examination of workmen to insure that they will produce uniformly satisfactory welds.

When it is considered that a variety of tests have shown that welds made by carefully selected operators will consistently show unit strengths in shear and tension four times the permissible stresses allowed by the code, the safety of welding seems pretty well protected by that instrument. Especially is this true since, according to numerous tests, visual inspection of welds by trained inspectors will reveal improper welds.

But efforts to develop a simple method of making field tests of welds in place must not relax if the legitimate field of welding is to be opened without further delay.

Capital Supply Must Not Be Jeopardized*

By FLOYD L. CARLISLE

Chairman Niagara Hudson Power Corporation

NEW capital is the most important part of the electrical public utility business. The public utility corporations are natural monopolies and have been for decades regulated more or less as to the rates charged for services rendered. This regulation in some states has also applied to approval of the securities issued by the companies rendering the services. The result of it all has been that the earning power of the corporations has never been sufficient to provide new capital for expansion. The most that the best public utility could do has been, after paying operating expenses and taxes and setting aside an amount to replace property which is wearing out in the service, to pay a modest amount to the investors who have provided the capital. This is unlike banking, insurance, and great industrial corporations which can pay attractive dividends to their investors and also expand with the growing necessities of the times. The utilities, for the reasons I have given, must secure practically all of the money required through new security issues. The large amount of money needed annually is evidenced by the fact that during the present year 43 per cent of all the securities offered for public sale were public utilities. This is a fact that few people in the United States fully realize. The gas and electric companies in 1931 will spend more than $1,000,000,000 for expansion. The growing demand for electrical service of every nature is such that this amount should increase each year. The real problem of the industry is to secure this great volume of money and to get it upon reasonable terms.

This enormous additional capital can only be secured in the money markets of the world in competition with the demands of all other kinds of securities. The demands of government bonds, foreign and domestic, of states, cities and villages, is for this same capital. Every offering of securities for banking, insurance and industrial purposes seeks the same market. This market is created from but one source, namely, the available savings of the individuals of the world over their living expenses. In the past the public utility corporations, particularly gas and electric, have been successful in securing this capital on terms that permitted their expansion, and at prices that enabled them, since the war, almost continually to reduce their rates charged for the services which they render.

Assuming that there will be continuing amounts of savings available for investment, there is, of course, no reason to doubt the outcome unless we pass into a new phase of regulation, or government ownership, which will lessen earning power and frighten capital.

Regulation meets local needs

You hear it said that the last election was a mandate to do something to change the present methods of regulation. May I analyze briefly the nature of present regulation? During the past 30 years practically every state in the Union has created public utility commissions which at least have the power of passing upon the reasonableness of the rates. The decisions of these commissions have been reviewed by both state and federal courts, and there has grown up a body of law defined through the decisions principally of the United States Supreme Court, which constitutes the present law of the land. These decisions have had the effect of making the investors and public utilities feel secure in the earning power of the industry.

Naturally, the laws of the different states have approached the problem from different angles, but under the Fourteenth Amendment of the federal Constitution it has been repeatedly held that the commissions must

**From an address before Bond Club of New Jersey, Newark, December 4.*

establish rates high enough to earn a reasonable return upon the property used in rendering the services. I think it is also the accepted law of the land that the value of the property at the time of the rate case must be taken into consideration in fixing the rates. The changes that are proposed reach really to an effort to break down what I term the law of the land. The federal courts have never permitted a greater earning than 8 per cent upon the value of the property in use. The principal critics of the present order of things assail the rule of the value at the time of the rate case. They contend that the actual cost of the properties should alone be considered. May I say at this time that in my judgment there would be, if anything, no lowering of rates upon this theory. But I do not believe the theory could ever be applied, because it is a violation of the Fourteenth Amendment. The officers of gas and electric companies cannot depart from the long-accepted rules as laid down by our highest court, and I do not believe that any legislation by the federal government or by the states can change this rule.

I furthermore think that it would be most unjust, certainly to the securities now outstanding, to apply to them a different rule than was in existence at the time of their issuance. Enormous rights have grown up under this rule. Practically every savings bank and insurance institution has purchased large amounts of public utility bonds, relying upon the soundness and permanency of this rule. And millions upon millions of people, both in this country and abroad, have purchased the preferred and common stocks of the companies, equally relying upon the security guaranteed by the Fourteenth Amendment.

Investor fixes capital cost

If a great national effort is made to change radically this rule it is going to render more difficult and more expensive the new capital, without which the industry cannot expand. The investor will, in the last analysis, fix the terms and prices for this new capital, and if he feels that his earning power is less secure, and is willing to buy the securities at all, he will demand a higher return. Aside from the effort that might be made to lower the earning power of the companies by some different rule or regulation, there are many people who are urging that the government itself enter the business. If the federal or state governments or municipalities in a large way started competing with the present companies there might, of course, be an impairment of their earning power. I cannot believe that the people of the United States, upon any evidence now before them, are prepared to take the step of government ownership. If such a step were taken, the government entering the business would have to seek the same and only reservoirs of capital that exist. Should the government enter into competition with the corporations, they might well destroy their earning power and wipe out the value of their securities. The public utilities today pay the greatest amount of taxes of any group of corporations within the United States. Approximately $400,000,000 annually is paid directly by them to the government-collecting agencies. In addition to this direct payment, all of the income received by investors upon bonds and stock is subject to all federal and state income taxes, which, while no exact figures are available, in my judgment amounts to at least $200,000,000 a year. All holdings of public utility securities are subject to death taxes, which amount to another immense sum.

The directors and officers of the utility corporations should so manage their business that service will be rendered at the lowest possible cost. They should be open and frank in all of their dealings. They should regard themselves as trustees of their consumers as well as of their bondholders and stockholders. There should be nothing whatever in the financial structure, rates and earning power of the corporation that needs concealment. In fact, I think they should go even a step further and openly condemn any practices in the industry that are unsound and unwholesome.

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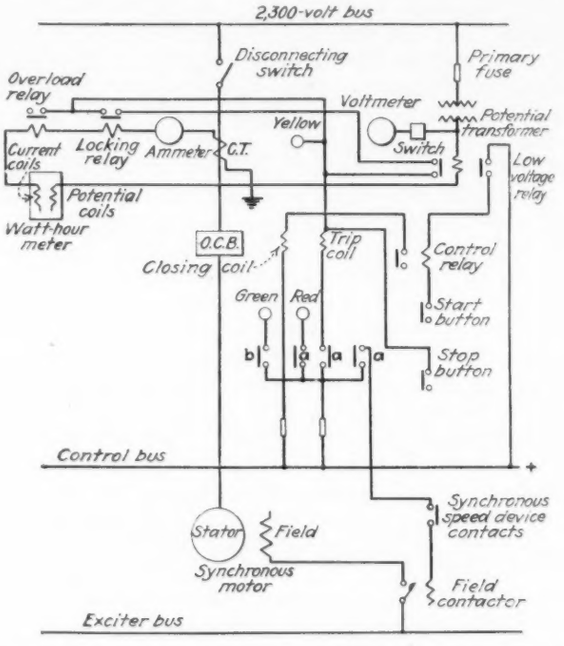
Steel Cubicles Incorporate Safety and Compactness

POPULARITY of the cubicle type of switchboard panel for industrial power-plant distribution has led to its adoption for controlling the larger synchronous and induction motors in the lumber and pulp and paper industry of the Pacific Northwest. Compactness and ease of installation and maintenance make these cubicles an economical safety-type steel inclosure for industrial and utility use. These steel cubicles completely inclose all live parts of the circuit, including the buses and disconnecting switches, and interlocks on all doors safeguard the operator by making the circuits inaccessible except when de-energized.

Each panel for a motor circuit is completely wired with its protective relays, watt-hour meter and instruments, as shown in one of the accompanying diagrams.

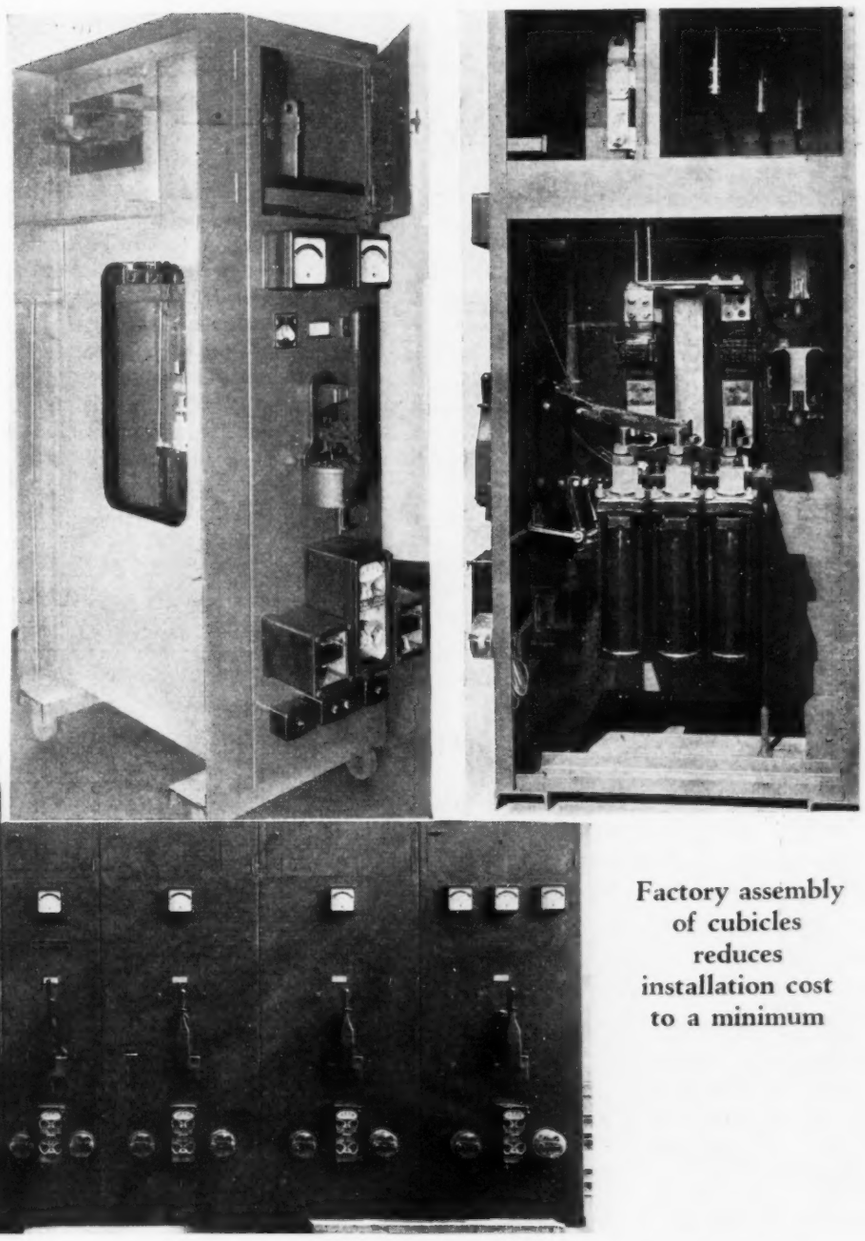


Schematic wiring diagram of single cubical unit

Connections as arranged for synchronous-motor full-voltage starting with automatic push-button control.

From five to ten cubicles are, as also illustrated, usually assembled at the factory and shipped out as one multi-circuit unit, thereby reducing installation cost to a minimum. The installation work consists merely of fastening the assembled units to the floor and connecting main incoming and outgoing cables.

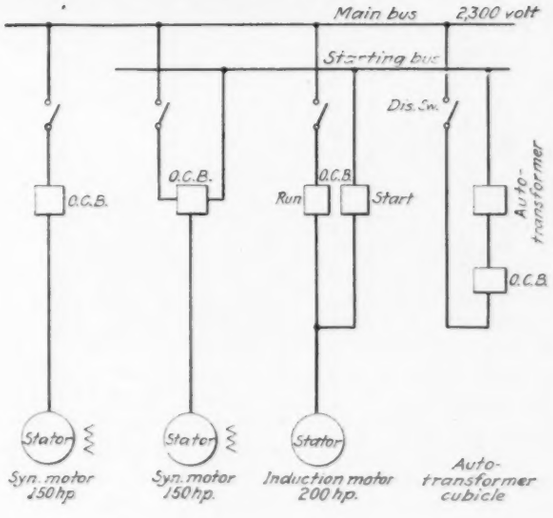
The cubicles are somewhat smaller than the conventional size. They are made in two sizes, measing 76 in. and 90 in. in height over all by 20 in. or 32 in. in width, and for either 440 volts or 2,300 volts. The 2,300-volt type is made in two styles, either with single bus for across-the-line starting or with double bus for reduced voltage starting of synchronous motors, or a combination of both. The accompanying elementary diagram shows the double-bus arrangement, where a single autotransformer is used for starting



Factory assembly of cubicles reduces installation cost to a minimum

several motors. Suitable interlocking prevents more than one motor from being started at a time. A feature of either type of board is the use of a lockout relay to protect the smaller breakers on the board against heavy short-circuit currents by transferring the duty to the main oil circuit breaker of high interrupting capacity. Normal overloads operate the motor breakers through overcurrent relays.

These units were developed by engineers in the Seattle office of the General Electric Company and built in the company's Seattle service shop.



Double-bus arrangement of multi-unit cubicle board

For both reduced voltage and across-the-line motor starting.

Proper Procedure Expedites Design Work

By W. B. MORTON

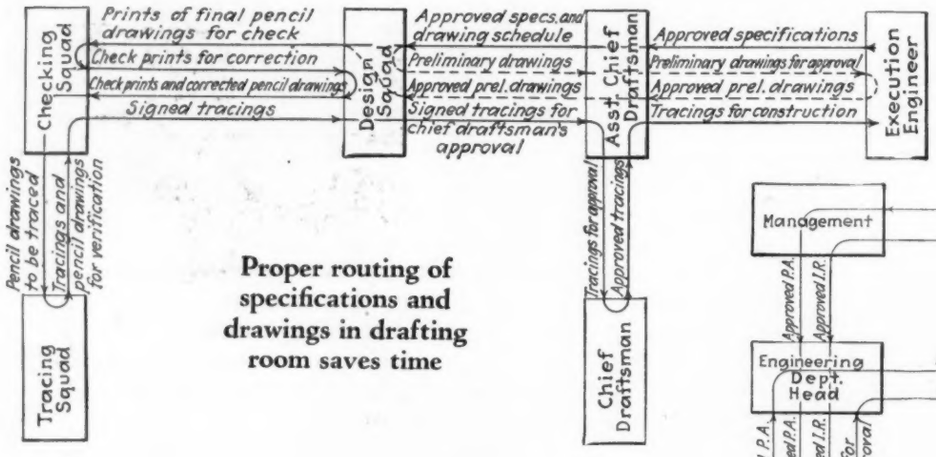
Southeastern Engineering Company, Birmingham, Ala.

In any large engineering organization, where management, operation, engineering and construction are closely allied, there exists a need for a procedure which will expedite and simplify the preparation of schedules, specifications and drawings when major improvements are contemplated. One successful scheme may be briefly described as follows:

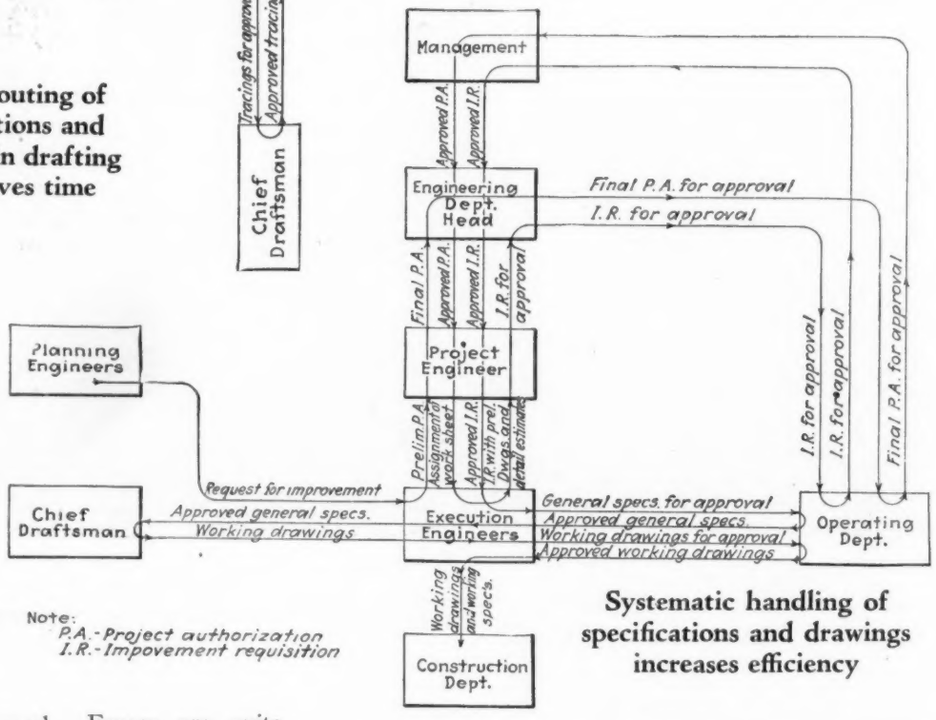
An estimate is first made of the number of "man-days" required for the completion of the engineering work on each project. The per cent of total project cost which should be set aside for design engineering is derived from a comparison of percentages compiled from cost records of completed work. The number of man-days required to complete the design of any project is obtained by dividing the appropriation for design engineering by a figure representing the average daily wage of the personnel. Errors are quite evenly balanced over a series of estimates; this method has been found to be fairly accurate for estimating personnel requirements and for distribution and assignment of work.

The next step is to set up a series of dates for delivery of drawings to the construction department. After all drawing dates are finally agreed upon the schedule is laid out graphically on cross-section paper, the ordinates representing time in days and the abscissas representing number of men. This graphic method indicates whether an impossible schedule is being attempted. Such compromises and rearrangement of work as can be arranged are made to smooth out the work curve and suit conditions.

Each job is assigned to an execution engineer, who follows all correspondence in connection with it. He assists the planning engineers in the preparation of a project authorization, which, when approved by the management, constitutes the authority for purchasing of material. After approval of the project authorization a separate improvement requisition is prepared for each of the several items in the project, which, accompanied by detailed estimates and preliminary layout drawings, is submitted to the management for final approval. The execution engineer, upon receipt of approval of the improvement requisition, writes a set of specifications constituting his contract with the drafting, operating and construction departments. After specifications are approved by the operating department, they are passed on to the chief draftsman, who assigns the job to a squad leader, who follows the progress of the work through the drafting room.



Proper routing of specifications and drawings in drafting room saves time



Systematic handling of specifications and drawings increases efficiency

On major projects preliminary drawings are usually prepared to accompany the specifications. These preliminary drawings are made in the drafting room as a rule, under the engineer's direction, although they are sometimes prepared by the execution engineer himself.

Before drawings are considered ready for construction purposes they are submitted for final engineering and operating department approval.

Field engineers follow the construction work on each job, representing the execution engineer and forming the contact between the construction forces and the engineering department.

Industrial and Utility Men Discuss Power Interchange

The possibility of both industrial plants and utilities benefiting from pooling their power, waste heat and surplus steam resources, either through joint plants or interchange of power, received the attention of a large group of industrial and utility men throughout one entire session of the A.S.M.E. convention December 2. Addresses on this subject by B. F. Wood, president Allied Engineers, Inc., and W. F. Ryan, mechanical engineer Stone & Webster, Inc., were briefed in the December 6 issue of ELECTRICAL WORLD.

Hearty accord with the principles expressed by Messrs. Wood and Ryan was voiced by several speakers, including C. F. Hirshfeld, John Lawrence, Guy B. Randall, R. J. S. Pigott, E. D. Dickinson, J. F. Daggett and J. G. Berger. But certain obstacles were cited that must be removed before much progress can be made.

Industrial competition is daily becoming more keen, so industrial executives should be receptive to any methods of reducing the cost of process steam and power and utilizing waste heat more fully. The idea of interconnecting utility and industrial plants to benefit by diversity is not new, as that is the basis on which utilities have always operated. However, interchange with industrial plants would add a new diversity.

Many psychological, physical and economic problems affect the pooling of resources. For example, Mr. Hirshfeld pointed out that since utilities are trustees of the public, they will have to consider seriously whether the industries with which they might interconnect or operate jointly will remain in business long enough to retire the investment and whether they will maintain their uses of power and process steam. This is particularly true in considering tie-ins with single large industries. Mr. Lawrence, who declared that industrials cannot afford to tie up too much capital in power production, as the return is less than when invested in the industry, contended that the chief obstacle to interchange of power with industrial plants is the hazard to service which their connection incurs.

An industrial viewpoint was expressed by Mr. Randall, who favored interconnection over joint operation of plants, when he said that the chief obstacles to pooling of resources are the complexity of contracts and apparent unwillingness to set reasonable prices on power bought and sold. The sooner utilities consider themselves common carriers, rather than sole manufacturers of power, the quicker will joint efforts be made to handle the utilization of waste heat and production of power and process steam most economically, he declared.

Three obstacles were emphasized by Mr. Pigott, who, nevertheless, expressed the opinion that great over-all economies may be effected by more consideration of jointly operated plants. The chief difficulty, he said, is the lack of confidence of industrials and utilities in each other. Just one example is the suspicion with which each looks on the other's reliability of power supply. Another obstacle to joint effort is the fact that surplus power from industrial plants is rated at 1½ mills per kilowatt-hour, whereas power sold to them is priced at 7 to 9 mills or more. Still, all surplus industrial power is not made available at times of minimum system demand, he declared. Until power-cost accounting is placed on the same basis in industrial and utility plants equitable prices for power bought and sold cannot be easily calculated.

Another factor that tends to discourage industrialists interconnecting with utilities, declared E. J. Kates, is the high charge made for emergency service connections. He cited one case in which $24 per kilowatt per year was charged for such a connection without allowance for any energy use—equal to 8 per cent on a $300 investment. He maintained that such an investment would not have to be set aside for emergency service due to the high diversity of emergency demands, and that a reduction of such charges would stimulate interconnections and still bring profit to the utilities. In this statement he was supported by Mr. Daggett, who declared that the complexity of bookkeeping involved is another item that discourages interconnections.

A careful study of industrial heat balances will frequently reveal the economy of combining purchased and generated power instead of generating all power, pointed out Mr. Berger, who referred to his experiences with industrial plants in New Jersey.

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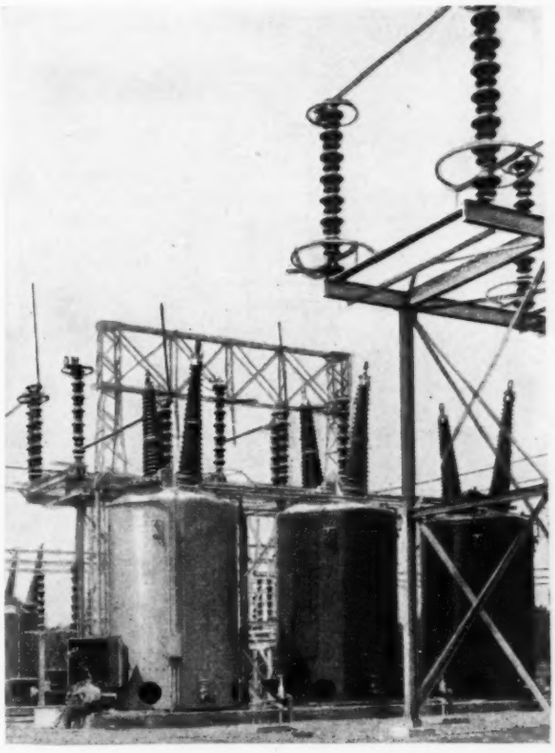
3,000,000-Kva. Breakers Operate in 8 Cycles



High-speed operation of these 220-kv. oil circuit breakers improves the service characteristics of the Roseland switching station of the Public Service Electric & Gas Company (New Jersey). They will completely rupture an arc in 8 cycles or 0.134 second, the elapsed time being from the instant when the trip coil is energized until the arc is extinguished.

Range-Water Heater Campaign B

After considering the various obstacles which utilities have encountered in trying to increase domestic revenue by stimulating electric range and water heater use, the Virginia Electric & Power Company has combined what it considers some of the best methods of removing these sales resistances.

EVERY utility company is eager to increase the revenue per domestic customer, but, with a few exceptions, little has been accomplished to bring it above the country's average of $30 per year per customer. Lack of progress has been due in many cases to the fact that combination gas-electric companies have hesitated to encourage use of electric ranges and water heaters, because they feel the sales effort will only transfer income from gas to electric accounts. However, there are many straight electric companies which have not increased their unit revenues because their programs for stimulating these loads have not incorporated all the features necessary to make these applications attractive to customers and to encourage the most vigorous cooperation of salesmen and contractor-dealers.

After attempting to view the domestic business problem from every angle, the Virginia Electric & Power Company, Richmond, Va., has combined what it believes to be some of the best methods used throughout the country in a system-wide campaign that includes large cities, small towns, competitive gas districts, and combination properties. No one of the elements of its program may be completely new, but the combination is believed by it to remove the major obstacles which have prevented the complete success of other campaigns. At this writing the campaign has only been conducted during two short intervals, March 17 to June 14 and September 8 to November 15, and rather limited sales forces have been employed, so the results shown can hardly be considered indicative of the success of the plan.

So that other companies may judge for themselves the applicability of all or parts of the Virginia plan to their local needs, the conditions which preceded the campaign, the preparation for it, the basis of conducting it and the results will be given.

Example of Rate Application

	Watts Demand
25 per cent × 10 sockets × 40 watts =	100
5 per cent × 8,000 watts (range) =	400
5 per cent × 3,500 watts (water heater) =	125
Billing demand kept by accounting department and put on bill	625

	Kw.-Hr. Used
Lighting	30
Refrigerator	70
Range	150
Water heater	300
	550

Calculation of bill (based on 0.6 kw. demand)

60 × 0.60 =	36 kw.-hr. at 8½ cents =	$3.06
120 × 0.60 =	72 kw.-hr. at 4 cents =	2.88
120 × 0.60 =	72 kw.-hr. at 2 cents =	1.44
Remaining	370 kw.-hr. at 1½ cents =	5.55
	(One month)	$12.93

Prior to the campaign all districts had been actively canvassed on domestic refrigerators for ten years so that they were publicly accepted by 8 per cent of the customers. However, semi-annual emphasis on the sale of ranges during the past four years had brought about their acceptance by only 1 per cent of the customers and water heaters had never been sold prior to March 1, 1930, because of existing electric rates and a highly competitive gas rate ranging from $1.30 to $1 per thousand cubic feet and averaging $1.25. The electric rate available to customers who would use electric cooking, heating or refrigeration in addition to lighting required a consumption of 100 kw.-hr. a month before a rate of 4 cents per kilowatt-hour could be earned—the lowest step in the rate. Another rate was in existence requiring two meters, one for lighting and another for heavy duty equipment, but the double meters and the fact that less than the 4-cent step could not be earned on heavy-duty applications except by consumption of more than 700 kw.-hr. per month made this rate equally discouraging to range or water-heater operation.

New rate minimizes cost of energy

Therefore, when it was decided to build domestic revenue by stimulating the use of ranges and water heaters it was realized that an attractive rate must serve as the foundation, although it alone could not be expected to produce results.

The new rate, effective March 1, 1930, was made optional and applicable to any residence customer who, in addition to using lights, installed and wired in a fixed location one or more of the following: Electric range, water heater or refrigerator. As shown elsewhere, the rate ranges from 8½ cents to 1½ cents per kilowatt-hour and depends on the hours use of demand. The basis for figuring the demand is simple, it being calculated from a survey of the customer's premises at the time of application. Common sense was practiced in establishing

Based on Customer Viewpoint

By the methods adopted initial cost and operating expense are removed as impediments, contractors and dealers are given an opportunity to benefit, salesmen are encouraged to do the best job, and location of prospects is aided. Results of a 135-day campaign are outlined and the methods of conducting it.

the basis for calculating the demand by applying a low percentage of the connected load installed and by the omission of portable appliances, convenience outlets and motors under 1 hp. from consideration in the demand. Furthermore, the rate steps are so arranged that most customers using average lighting, portable appliances and a refrigerator will earn a rate of 2 cents for part of the range consumption and the water heater can be operated to a large extent on the 1½-cent step provided a range is also used. An example is given to show how the rate affects a typical customer using light, refrigeration and a range. It may be noted that the particular all-use customer's bill is only $12.93 per month.

Prior to establishing the new rate, all domestic customers' monthly bills for one year were compared with what they would be under the new rate. In virtually all cases, with the exception of showplace residences, which would have a big billing demand and relatively small use of demand, it was found that there would be a saving in going onto the new rate, but the change was left optional with the customer.

Rather than try to make abstract explanations of the rate to customers, advertising and preliminary talks before various clubs were used to show how inexpensive the use of ranges and water heaters would be if a customer already used lighting, the usual household appliances and refrigeration. Emphasis was placed on the small increment cost of using these additional services. To remove the possible objection that the initial cost of a range or water heater installed is too high, two policies were established. One is to include a flat rate for installing such equipment in the initial cost of the equipment. The other policy is to allow easy payments on the cost of the equipment plus its installation.

The flat rates for wiring and installing equipment are as follows:

Ranges	$45
Water heaters (2½ kw.)	50
Range and 2½-kw. water heater	60
Range and larger water heater	65

The prices of ranges sold in the campaign ranged from $135 to $260 and water heaters from $130 to $150. Two classes of water heaters were featured—an 18-gal. and a 30-gal. tank. The latter is rated at 2½ kw. and has two heating elements, one near the bottom and one near the top, the latter for giving quick response to hot water needs. The 30-gal. tanks were recommended to the average home to assure adequate hot water, customers' needs and satisfaction being considered of paramount importance, even though such a policy might lose the sale of the lower priced heater, which might be inadequate. Time switches are not required on the water heaters.

Down payments of $10 were permitted on refrigerators, ranges and water heaters and an allowance of $15 made for any range or water heater displaced. When both a range and water heater are purchased installment payments may be spread over 24 months; eighteen months is allowed on refrigerators, and 30 months on purchases of all three. Installment payments are billed on separate statements from the regular electric bills but attached thereto, and 6 per cent is added for carrying charges.

Good will of contractor-dealers was a major consideration in the campaign.

To secure the co-operation of contractors all wiring installations were divided among them. No specifications were issued because rigid city requirements made these unnecessary. Each contractor was paid the actual cost of installation plus a legitimate profit

Results of Two Short Campaigns

March 17 to June 14 and September 8 to November 15

(A)	Number of ranges installed	980
(B)	Saturation obtained (per cent of domestic customers in district having highest saturation)	17.62
(C)	Number of water heaters installed	515
(D)	Highest saturation obtained (per cent of domestic customers in district having highest saturation)	2.46
(E)	Number of utility salesmen involved, full time	27
(F)	Advertising	$13,000
(G)	Total value of ranges and water heaters installed	$235,000
(H)	Per cent sold by others than utility	10
(I)	Amount of wiring done by contractors	$75,000
(J)	Estimated annual consumption of added load, kw.-hr.	3,300,000
(K)	Estimated annual revenue of added load	$80,000
(L)	Former average revenue per domestic customer, twelve months ended February, 1930	$34.83
(M)	Present average revenue per domestic customer on new rate, twelve months ended October, 1930	$36.03

upon completion of each job, regardless of whether it ran over the flat rate offered the customers, but itemized bills had to be submitted on each installation so the utility could advise the contractors how to effect savings on the next job and so an analysis could be made of average costs in future campaigns. Even though only a range is installed, three No. 4 wires and a 60-amp. switch are required for service entrances to care for future additions of load. This was done as it was recognized that it is cheaper to provide for the future than make changes later.

Dealers handling refrigerators, ranges and water heaters are encouraged to co-operate by permitting them to buy their stock at attractive prices. If the dealer chooses, he may sell from utility stock and receive a 25 per cent sales commission. When dealers take advantage of the latter method, the utility will carry the account of the customer and assume the servicing responsibility.

Sales compensation encourages balanced effort

So many sales efforts have fallen short of what might have been accomplished because of the method of paying salesmen that the Virginia Electric & Power Company decided it must modify its previous basis of compensating salesmen. One requirement was that the salesman's compensation should encourage him to give adequate attention to prospects who might be relatively difficult to sell and to insure satisfied customers. Hence a flat salary was instituted as one element of the compensation. To compensate for the difficulty of selling domestic equipment like refrigerators, ranges and water heaters, the salesmen receive in addition to the flat salary a commission based on the cash price of equipment exclusive of wiring and installation. The third element of compensation, which is most frequently omitted, is a sales inducement to increase the use of range water heater and refrigerator applications. This consisted of a bonus per kilowatt-hour figured on the estimated annual consumption of the device sold, namely, 1,800 kw.-hr. for ranges, 3,000 kw.-hr. for water heaters and 800 kw.-hr. for refrigerators.

Additional inducement to salesmen was established by prizes—$10 to each one making his bogey, $50 for the highest record, $30 for the second highest record, $20 for the third highest record, and the president's loving cup to the winning district.

Employees, other than salesmen, are paid $3 for every range or water heater sales tip that results in a purchase. During the March to June campaign 459 of these tips resulted in sales.

Believing that use of refrigerators, ranges and water heaters by employees is one of the best ways of convincing the public of their value, these appliances were sold to employees at very attractive prices and the installment payments carried on the same terms as the public's, but without interest.

Basis for selecting prospects

To serve as a basis for determining the location of prospects, all salesmen were used during the entire month of February to survey the uses of electricity by domestic customers. These data were recorded on "rate-check" cards of the character shown in an accompanying illustration. (As mentioned previously, these data were brought up to date upon application for the new rate to determine the billing demand used by the accounting department.) For use as guides to prospects, these cards were filed by streets, and tabbed with red, blue and yellow signals to indicate whether the customer had a refrigerator, range or both.

Average home owners were considered the best prospects, as the more costly homes use servants extensively and are not so interested at present in the convenience of electric ranges. Financial status was not considered so important, it being found that the degree to which customers had already applied electricity is a better guide to receptiveness toward additional applications. Character of locality also served as an indication whether the residents would be good, fair or poor prospects.

Greatest opportunities for range and water heater sales existed in non-gas territories in new suburban developments, although effort was not confined there. If a customer already had a refrigerator he was considered a good prospect for a range, as the combination would usually allow the range to operate on the lower steps of the rate. For similar reasons a customer having a range can be more easily interested in a water heater.

On the basis of customer surveys and man-power available it was decided that the bogey for the entire system during the March 17 to June 14 campaign should

Old Rate for Combined Lighting and Appliance Use

Available to customers who in addition to using lighting service have installed and wired in fixed locations one or more of the following: Electric cooking equipment, electric heating equipment, or refrigerator.

Kw.-Hr. per Month	Net Rate per Kw.-Hr. (Cents)
First 40	8½
Next 60	5
All excess	4

When the connected load is not more than 5 kw. the minimum bill is $30 per year but not less than $1 in any one month. For each kilowatt of connected load in excess of 5 kw., the annual minimum bill is increased $5. Portable appliances are not considered in determining connected load.

*Old Rate for Battery Charging, Heating and Refrigeration Did Not Cover Lighting**

Required guarantee of monthly consumption equal to 30 hours use of demand

Kw.-Hr. per Month	Cents per Kw.-Hr.
First 700	5
Next 1,500	3½
Next 7,800	3
Next 15,000	2½
All excess	2

*Lighting service had to be furnished through separate meter.

New Rate for Stimulating Use of Electric Range and Water Heater (Optional)

Available to residence customers who in addition to lighting service have installed and wired in a fixed location one or more of the following: Electric range, electric water heater, or electric refrigerator. Applicable March 1, 1930.

Hours Use of Demand* per Month	Cents per Kw.-Hr.
First 60	8½
Next 120	4
Next 120	2
All excess kw.-hr	1½

*Demand based on 25 per cent of total lamp sockets at 40 watts each, and 5 per cent of motor, range or water heater rating in watts. Portable household appliances, convenience outlets and motors under 1 hp. not considered in determining demand. Minimum billing demand, 600 watts; minimum bill, $2 per month. Where water heaters rated at more than 5 kw. are used an additional monthly charge of 50 cents per kilowatt in excess of 5 kw. is made.

H. E. S. RATE CHECK
Vepco Form 355

Name ..... Address ..... Acct. No. .....

Present Rate ..... Charge to .....
No. Lighting Outlets ..... Billing Demand ..... Kw.
Range—Kw. ..... Make ..... Billing Demand ..... Kw.
Water Heater—Kw. ..... Make ..... Billing Demand ..... Kw.
Motors—Hp. ..... Make ..... Billing Demand ..... Kw.
Refrigerator ..... Make .....
Oil Burner ..... Make .....

Total Billing Demand ..... Kw.

Checked By .....

Service Order No. ..... Date .....

be 400 ranges, 125 water heaters and 225 refrigerators. Each salesman was given a bogey of sixteen ranges, five water heaters and nine refrigerators, or an estimated annual consumption of 51,000 kw.-hr. to be developed by each salesman. On the average one salesman was employed for every 4,500 customers. The bogey and sales staff were slightly increased for the last campaign, September 8 to November 15, which covered a shorter period than the spring campaign, the system bogey being 1,300,000 kw.-hr. The bogey for both campaigns totaled 1,000 ranges and 400 water heaters. It was based chiefly upon man-power available for sales.

Dependence is placed chiefly on personal calls and advertising, because most customers pay their bills by mail and hence do not visit the display room. However, outside salesmen are rotated on the display floor, which is always attended by one woman range-and-water-heater specialist in addition to the general salesmen.

Besides the preparations discussed, the following activities contributed to the conduct of the campaign. The equipment manufacturers sent representatives to the property and conducted sales and service schools on ranges and water heaters. Thereby all utility salesmen were familiarized with the lines, prices, uses and methods of figuring hot-water demand. A factory water heater specialist worked throughout the campaign with utility salesmen. Home-service demonstration schools were conducted. The campaign was started by a banquet, at which all plans and procedure were explained. Three thousand employees were acquainted with the new rate. Sales meetings were held every morning to line up prospects for the day's work.

Serving the new load

Aside from the sales problems involved in this campaign, there was the engineering problem of serving the added loads and providing for the future.

For example, virtually all the residence section of Richmond, Va., is supplied by overhead service as primary and secondary lines can be run through alleys. These alleys average about 300 ft. long, so that one 50-kw. transformer mounted at the middle of the block and serving No. 1/0 secondaries is expected to care for all the range and water heater load that may be developed in the next few years. If the customer acceptance of these two services were to become so popular that every customer used them, it is calculated that it would be necessary to go to two 50-kw. transformers per block, situated about 100 ft. from each end and serving the same size secondaries. Apartment houses are served by individual transformers installed in vaults in the basements.

Of course all sections are not laid out on the basis of 50-kw. transformers and No. 1/0 secondaries now, there being many smaller transformers and considerable No. 4 secondaries. But as range and water heater loads are added the transformer capacity will be increased, secondaries changed to No. 1/0 conductor and house services increased to three No. 4 conductors.

The transition is taking place in the following way: As new range and water heater customers are taken on the distribution department is immediately notified and the construction crews assigned to put in the next largest size transformer if necessary, increase the size of secondary for the whole block in which the new range customer is added and install new house service drops. Putting in a whole block of new secondary is favored over patching in just enough No. 4 wire to serve the customer as adjacent customers may add ranges that would make the cost of increment installation of secondaries more costly.

The ranges and water heaters sold in these two short campaigns covering about 135 working days will consume about 3,300,000 kw.-hr. yearly and bring in an estimated revenue of $80,000. One of the most significant facts is that, despite the anticipation that the new rate would effect a large reduction in domestic revenue, enough additional business was secured by the methods described so that there has been a 7 per cent increase in revenue per domestic customer over the same period last year. This has been obtained with a 20 per cent increase in customer usage of energy, so that the customers have profited considerably more than their bills have increased. It is interesting to observe that 13 per cent of the ranges and water heaters were sold in gas territory.

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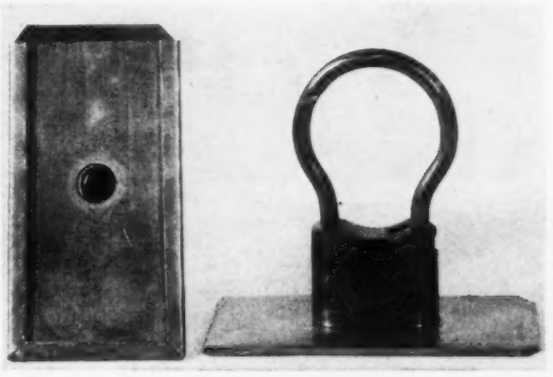
Combined Switch Lock and "Hold-Off" Warning



Line and substation switches may be locked and kept safely open, when the line is de-energized for repairs, by a padlock with a warning-card holder attached. On the Metropolitan Edison system, where this system is employed, the card holder is a brass plate with V-shaped edges and is soldered across the butt end of the lock. A hole in the plate allows the key to be used in the usual way except when a red warning ticket is inserted to cover the key opening. According to Vernon W. Palen, engineer in the transmission and distribution department, this combination "hold-off" warning and lock has proved very effective.

75-Kv., Three-Conductor,

By E. F. NUEZEL

Columbia Engineering & Management Corporation, Cincinnati, Ohio

THE unblemished operating record of the single-conductor, 132-kv., oil-filled cable in New York and Chicago and the three-conductor, 35-kv., oil-filled cable in Staten Island, Syracuse and Chicago is convincing evidence of the soundness of the electrostatic and physical principles involved, while the periodic operating dielectric test data obtained conclusively indicate permanency and continued successful operation.

With this in mind, the Union Gas & Electric Company has taken a step forward in the oil-filled cable field with a recent installation at its Columbia station. It was found advisable to place under ground four 66-kv. overhead tower line circuits in order to relieve a congested condition of lines on the station property. Five cables were installed from the Columbia station to a new terminal structure approximately 1,300 ft. north of the station. One cable is a spare.

This is the first installation of 75-kv., three-conductor, shielded-conductor type, oil-filled cable in this country and it is unique in several respects.

Many features in the design of the cable and its accessory equipment are entirely new and original developments of the General Electric Company to meet the particular requirements of the installation.

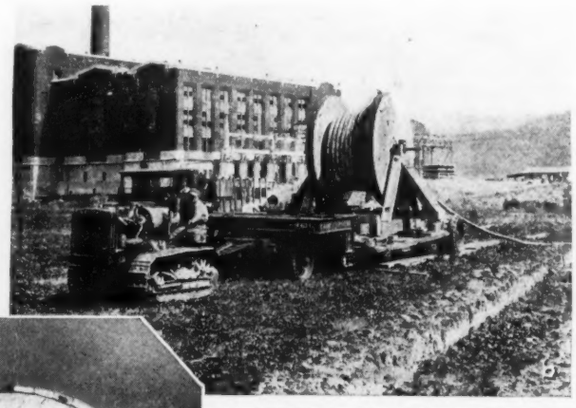
The cable is armored and is buried directly in the ground in about one-quarter mile lengths, in one piece, without joints from terminal to terminal. This was the most economical solution of the particular problem because no conduit system or joints were required.

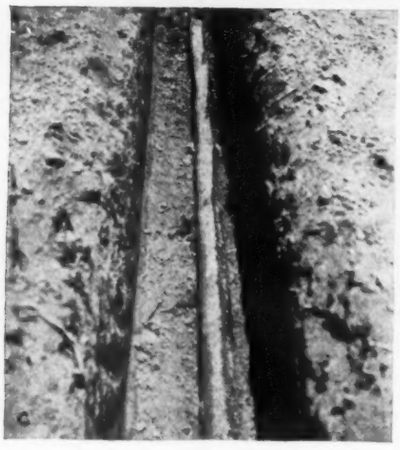
Through a common bus arrangement the spare cable may be connected to serve any one of the four circuits should one of the cables develop a fault.

The cable will be operated between 66 and 70 kv. The

Cable installation steps

(a) Paying cable to trench from trailer.
(b) The cable reel was mounted on special rigging on a trailer.
(c) Cables were buried 3 ft. in the ground.
(d) Oil expulsion test on cable.
(e) Temporary oil reservoirs mounted in the hub of the cable reel.





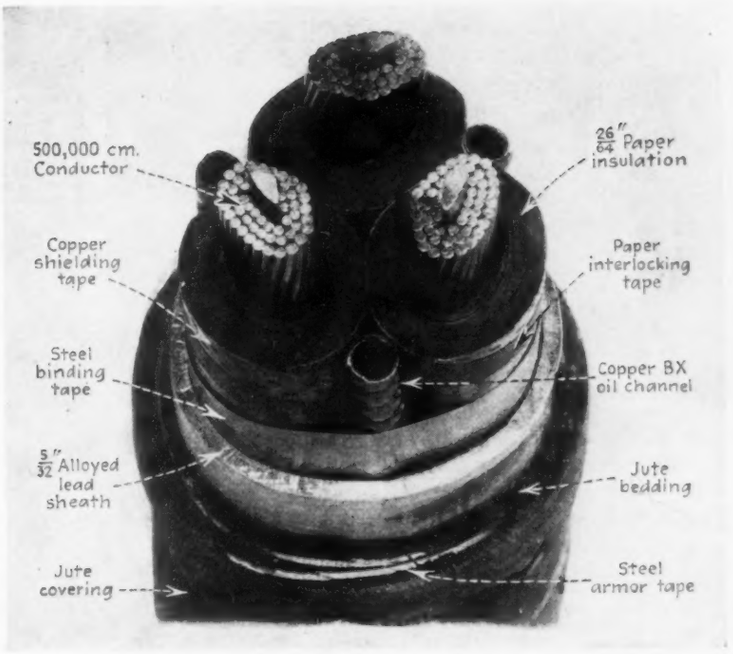
Oil-Filled Cable

First installation of 75-kv. cable at Cincinnati

Details of cable

Methods of installation

Oil reservoirs, valves and degasifying plant



75-kv., three-conductor, oil-filled cable of Union Gas & Electric Company

75-kv., 500,000-circ.mil, semi-sector, paper-insulated, shielded-conductor type, lead-covered armored cable.

cable conductors are 500,000 circ.mil, of semi-sector construction, and each phase is insulated with 26/64-in. wood pulp paper, the density of which is graded between the conductor and shield. Each phase is shielded with a 4-mil perforated copper shielding tape with a paper-interlocking tape, thereby converting each phase electrically into a single-conductor cable.

The filler spaces are used to house copper "BX" oil channels, which permit escape of oil laterally along their entire length. All three of the shielded phases and the oil channels are cabled together with a 5-mil steel binding tape, also applied with a paper-interlocking tape.

A $\frac{5}{32}$-in. lead sheath alloyed with $2\frac{1}{4}$ per cent tin covers the entire assembly. The cable is armored with two 50-mil steel armor tapes in jute bedding and with jute over all. Degasified oil, under pressure of 15 lb. per square inch maximum, permeates the entire cable structure. Each foot of cable contains about $\frac{1}{3}$ gal. of oil. The cable has an outside diameter of $4\frac{1}{16}$ in. and weighs about 22 lb. per foot.

Unlike the original installations of oil-filled cable, this cable was shipped full of oil under pressure maintained at about 10 lb. per square inch by two temporary reservoirs mounted in the reel.

Each reel was given an expulsion test in the field as a final check to make certain that there was not an exorbitant amount of occluded gas in the cable. The test was made by measuring the expulsion of oil from the cable in a given length of time at a definite temperature and pressure. This expulsion is caused by the energy stored up in the occluded gas, and also by the resiliency of the cable structure.

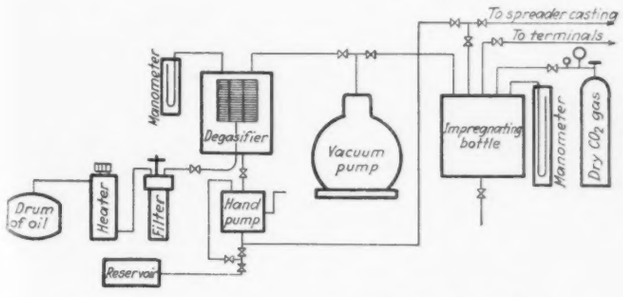
The cables were buried directly in the ground, in five separate trenches, below the frost line to a depth of 3 ft. and with a separation of 5 ft. between trenches to effect adequate isolation and radiation between circuits. The trenches were dug with a trenching machine, the belt of which was arranged so that the discharged dirt back-filled the adjacent trench as each successive trench was dug.

Each reel contained about 1,300 ft. of cable and weighed about 17 tons. Special rigging supporting the reel on ball-bearing trunnions was mounted on a trailer and the cable was payed off the reel as the rigging was pulled along with a tractor. Pressure was maintained on the cable during the entire laying operation by the temporary reservoirs in the reel. It was originally planned to straddle the trench with the trailer and pay the cable off the reel directly into the trench, but on account of the weight of the equipment, which was about 25 tons, this could not be done safely.

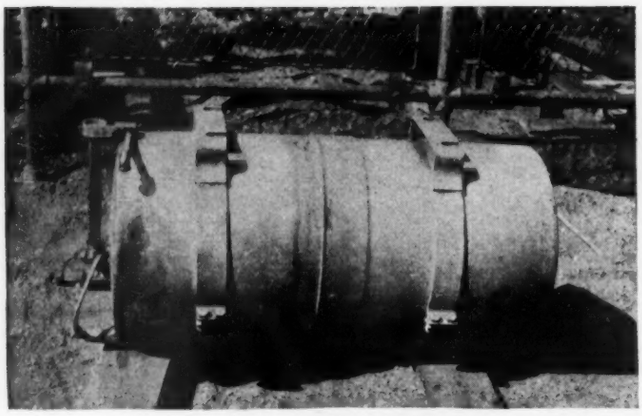
Before the last few turns of cable were removed from the reel temporary reservoirs were connected at the pulling eye, and after pressure was established the reservoirs in the reel were disconnected and the end of the cable was released from the reel.

Whenever the free end of the cable was elevated on the structure precautions were taken to insure against negative pressure in the elevated end by pumping up the reservoir on the far end to a pressure greater than the hydrostatic head, or by connecting temporary reservoirs at the elevated end. Permanent pressure gages were mounted at each reservoir connection to provide a constant check on the oil pressure.

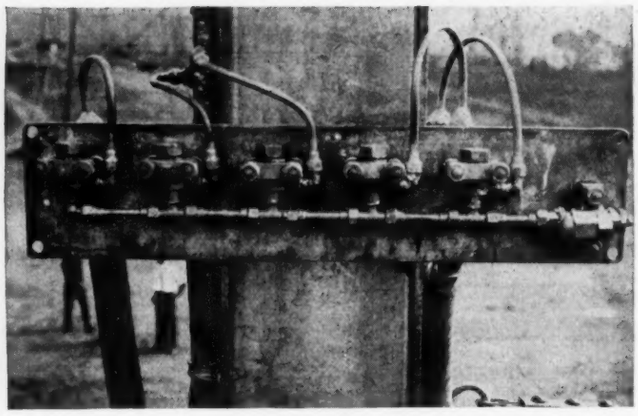
In order to effect the change from the three-conductor



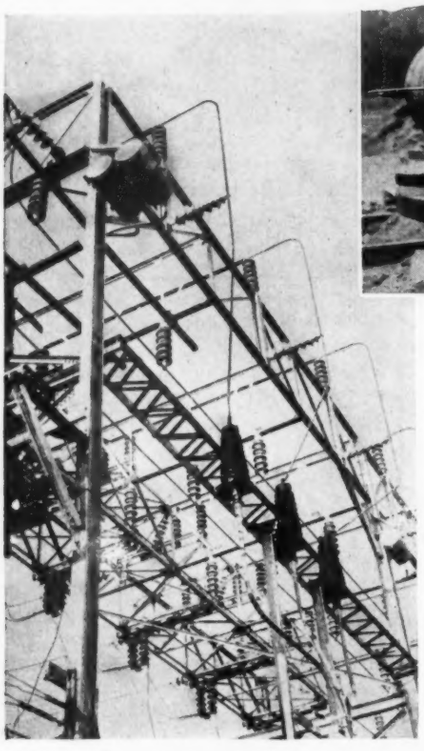
Schematic diagram of degasifying plant

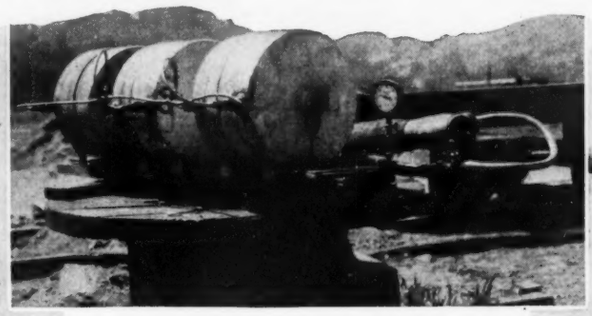


Each oil reservoir is provided with a gage



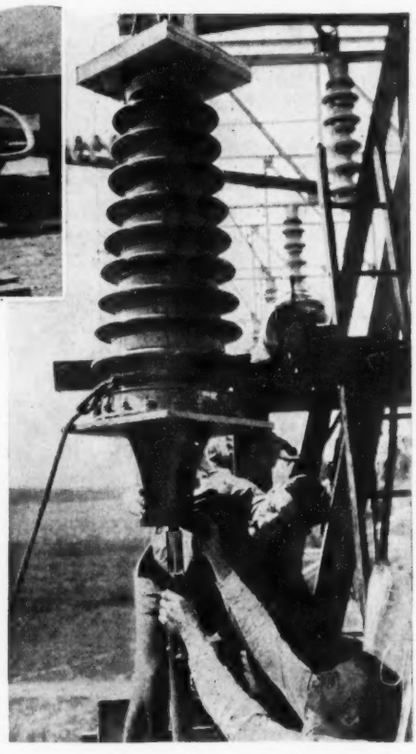
The valve panel for cable oil reservoir





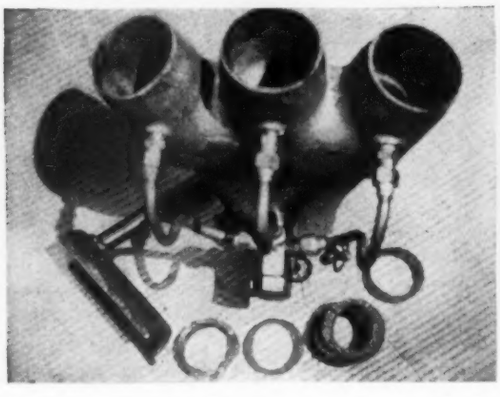
Temporary oil reservoirs were connected to pulling eye

General view of tanks and terminals

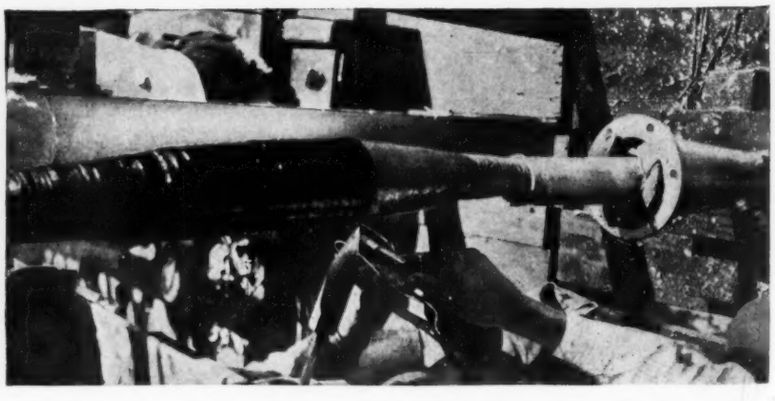


Lowering the pothead into position

Spreader casting for changing three-conductor to single-conductor cables



Completed stress cone on cable—a precise operation



cable to the three single-conductor cables at the terminals for the single-conductor pothead connections a special spreader casting was used. The spreader casting was slipped down over the cable several feet at a time as the sheath, tapes and oil channels were removed. Each shielded phase was worked through its respective outlet.

Semi-stop joints of cork were installed in the spreader casting in each of the single-phase outlets, thereby effecting a barrier between the three-conductor cable connection of the casting and the single-conductor outlets. The presence of the stop joints was to permit treating each pothead assembly individually and to confine the treatment to the ends without contaminating or affecting the cable.

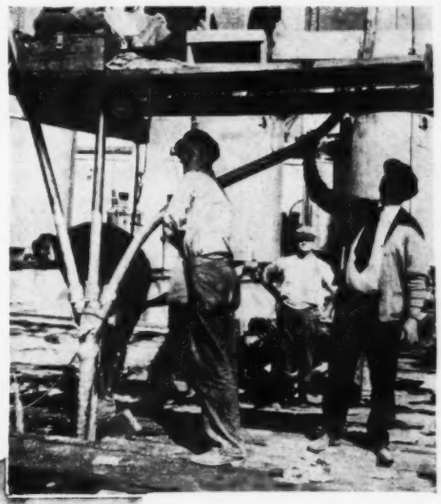
In normal operation these semi-stop joints are bypassed with copper tubes to permit the flow of oil from the reservoir connection at the spreader casting to feed the potheads.

Each shielded phase was converted into a single-conductor, lead-covered cable by placing a lead tube over it. These tubes were placed in the straight condition and were shaped into position afterward.

The three-conductor, lead-covered cable was wiped to the bottom of the spreader casting and the three tubes were wiped to the top of the spreader casting.

The shielding tape on each phase was terminated in a hand-applied stress cone to relieve stresses and was made up of low-loss, varnished-cambric tape, shielded with narrow copper-shielding braid. The slope of the stress cone conformed with the taper on the wiping bushing and terminated at this point.

Shaping the phase cable into position



Permanent oil reservoirs mounted on the structure

Moving spreader casting down several feet at a time

Installation of permanent reservoirs

The potheads used were 110-kv. rating and were shipped with tube barriers built integral with them and were lowered into place without having to disturb the gasket between the porcelain and the base. The placing of the pothead was facilitated by the use of a guide rod which was passed down through the pothead and screwed temporarily into the terminal stud.

After the terminals had been completely assembled, three cycles of dry CO_2 gas, each followed by vacuum treatment, were given to the entire assembly, after which the degasified oil from the degasifying plant was pumped into the assembly from the bottom at the spreader casting until good degasified oil came out at the top. The assembly was then sealed off.

After the assembly was completed, it was connected to the permanent reservoirs mounted on the structure above the terminals. Each cable is supplied by two 10-gal. reservoirs, one on each end, mounted exactly at the same elevation, and they feed oil into each end through a connection at the spreader casting.

These reservoirs are the gravity feeder type, in which the degasified active oil is contained in a series of oil cells inclosed in a tank, and are actuated by atmospheric pressure through a breather pipe connection. This pressure is exerted on dead oil provided between the oil cells and the tank.

Each tank is equipped with a sight gage to read active gallons of oil, and at the station end of the cable each tank is equipped with an alarm device built into the sight gage. A small metallic float rides on the dead oil level and closes electrical contacts at a predetermined value when the oil level gets too low.

All of the reservoirs at each end are connected to a centralized valving point called the valve panel, and the reserve oil capacity of all the circuits can be made available through a manifold connection to feed a leak, should any occur on the system, thereby allowing ample time to locate and repair the leak before failure occurs.

A portable degasifying plant was used in the field to do all of the treating of the terminals, as well as for degasifying all the oil used in filling the assemblies.

Each of the cables was given an acceptance test of 110,000 volts to ground for fifteen minutes with a kenotron test set. This test was the highest obtainable with the kenotron set on hand.

All of the cables are now in service and have been operating successfully since October 1.

The engineering work for the project was done by engineers of the Columbia Engineering & Management Corporation and the installation by the Union Gas & Electric Company under the supervision of field engineers of the General Electric Company.

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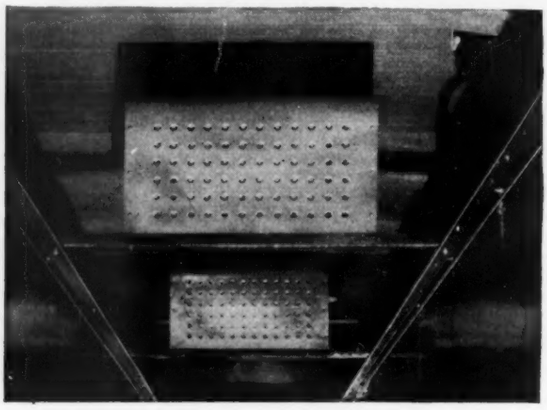
Heated Floor Warms Substation Operators

Warming substations where there is little or no electrical apparatus to give off heat has always been a problem. Various attempts to keep operators comfortable in cold weather, even to the extent of using 15 kw. of electric heat in one substation, were tried by the Los Angeles Bureau of Power and Light, and still there were complaints and sickness. Based on the fact that



8 kw. of heat applied directly beneath operating floor

when a man's feet are warm he is warm all over, an entirely new method of heating was tried.

Instead of depending entirely upon heaters placed at various points within the substation room, electric heaters were installed in the basement directly beneath the operator's desk. It was found that two 4-kw. heaters mounted 3 ft. beneath the floor, supplemented by 9 kw. of heat in the room itself, supplied ample warmth and stopped all complaints and sickness. The accompanying illustration shows these heaters in the bureau's station B. It is surprising that, notwithstanding the heat-insulating properties of concrete and the apparent inefficiency of application, 8 kw. of heat utilized in this manner will keep an operator comfortable in a room 45x70 ft. with 20-ft. ceiling, whereas there seems to be no limit to the amount of heat required when applied entirely within the room itself.

So successful has been this installation that the same method has been applied to several other substations and was utilized also recently in a new substation of one of the large private utilities operating in southern California. Credit is due H. H. Cox, superintendent receiving and distributing substations of the Bureau of Power and Light, for originating the idea.

▼

Load Dispatcher's Need for Quick Decisions

By P. B. JUHNKE
Chief Load Dispatcher Commonwealth Edison Company, Chicago

Even in the most carefully designed and most cautiously operated power system there may arise situations where quick action on the part of the load dispatcher is required in sacrificing some load in order to maintain supply to other load inherently of greater importance. This does not necessarily imply preference of one set of customers over another. The reasons are entirely technical.

For instance, a large three-wire direct-current system would have to be preferred in service maintenance on account of the vast difficulties that arise in restoring service to it after an interruption. To pick up such a system after an interruption would require the simultaneous closing of the rotary capacity of from ten to fifteen substations, totaling, possibly, 100,000 kw. or more in Chicago—a task almost unthinkable. The resistance of such a network is almost zero, and the smallest differential in the time in which one set of rotaries might be closed ahead of the others would result in the tripping out of the rotaries thus closed in, or else it might result in fuses blowing all over the network. Another way of restoring the service of such a network would be to cut it into sections, one for each substation —also a task not of minutes or even hours, but possibly of much longer periods.

From this it is apparent that such a network could not readily be picked up after an interruption, and therefore it may be justifiable to give preference to such a service over the general supply. If the high-tension supply to such a service is from the total system and such a service should become involved in serious trouble, it would most certainly behoove the load dispatcher to sacrifice load such as might be picked up in a moment to keep a network supplied where hours would be required to pick the load up if the cause were loss of essential generating capacity.

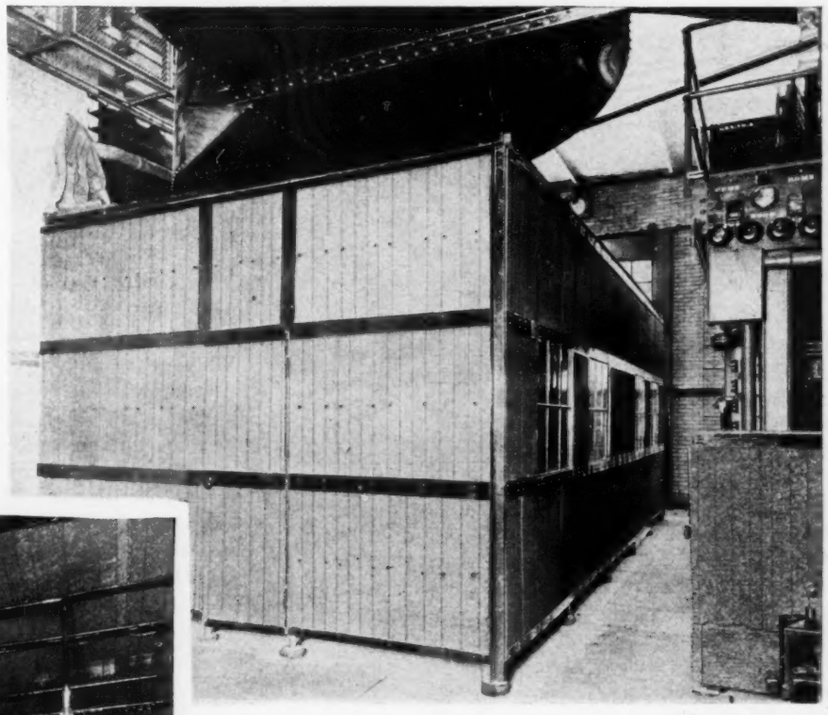
In view of these conditions, there are outstanding in the Commonwealth Edison Company instructions to the load dispatcher to direct as quickly as possible the interruption of all radial load when quick relief is needed in order to keep intact the supply to the Edison three-wire system, totaling about 120,000 kw. A quick decision on the part of the load dispatcher to sacrifice some load in order that another kind of load may be maintained is made difficult by the rarity of such occasions. Some of the force have never seen such an emergency, and yet the promptness with which such a decision was reached in a given emergency would be a measure of the performance of the load dispatcher on duty.

No More Noise

By A. S. HOEFFLIN
Louisville Gas & Electric Company, Louisville, Ky.

SUPPRESSION of noises emanating from electrical apparatus in substations built in residential districts is becoming a matter of first importance in public relations. To the citizen with good ears and a susceptible nervous system it makes no difference that the noise he objects to comes from equipment necessary for the supply of electricity to his lamps and his appliances. He takes the position, quite rightly, that while the electricity supply is necessary, the noise is not. Such a situation existed in the neighborhood of the Southern substation of the Louisville Gas & Electric Company.

This substation included an outdoor installation of six 2,000-kva. transformers and a 1,500-kw. motor-generator set, twelve 100-light mercury-arc rectifiers and a number of feeder regulators inside the building. Tests and observations showed that the transformers contributed

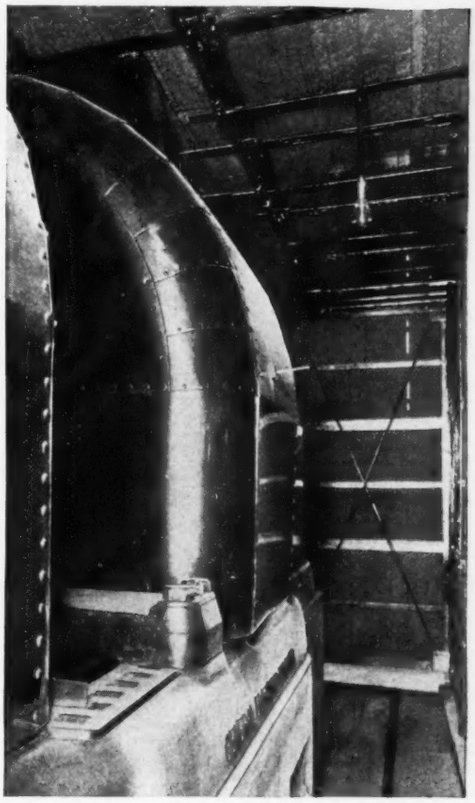


The noise is corked in

These cork walls and ceiling surround a 1,500-kw. motor-generator set inclosed in a sheet - steel housing through which air is drawn by an exhaust fan on the roof by means of the duct overhead.

Inside the silencer

The cork slabs of walls and ceiling are held on a light steel framework. The darker line in the floor indicates the cork separator between the machine foundation and the building floor.



their hum to the chorus, that the motor-generator added the sound of its brush and windage, that the regulators threw in their monotones, and that the arc rectifiers, though least conspicuous in the orchestra, were not wholly silent by any means. The building itself probably contributed to the propagation of noise through the neighborhood, because it naturally acted as a sounding board for the vibrations transmitted to it from the apparatus in and near it.

In order to arrive at a definite determination of the noise level at points throughout the area and also to reach an evaluation of the efficacy of the methods of suppression, a microphone was connected by about a thousand feet of ordinary lamp cord to equipment in the station such as is used in telephone work for determination of standard noise units. Readings were taken at various points, including those from which complaints came, and were plotted on a sketch map showing streets, alleys and residences. Following the application of the remedial measures, readings taken at the same points furnished a definite index of the improvement. The use of this

equipment was particularly worth while in that it permitted complainers actually to see that the noise level had been lowered and gave them a psychological impulse away from further complaint.

After some preliminary testing of means and methods, the following dispositions were made to reduce the noise:

The transformers were set on cork slabs and a cork chimney was built around each one extending from a few inches above the base to several feet above the top of the case. The inclosure thus permitted adequate ventilation for the transformer while absorbing radiant noise. The cork in the base prevented transmittal of vibration to the building structure. The motor-generator was inclosed in a sheet-steel housing connected by a duct to an exhaust fan in a penthouse on the roof of the substation. Then a room with cork walls and ceiling was built around the inclosed machine. To prevent vibration from being transmitted to the building a 2-in. separation was cut and filled with cork between the machine foundation and the building floor. The mercury-arc rectifiers and the feeder regulators were set on cork slabs.

Tests made with the microphone after these arrangements have shown them to be remarkably effective in reducing the noise. No further complaints have been received from residents in the vicinity, and apparently the substation is now accepted as an inoffensive neighbor.

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French Electrical Industry Doubles Every Four Years

By Consul DAMON C. WOODS
American Consular Service, France

THE general economic depression in the last quarter of 1929 caused a slowing up in the industrial consumption of electricity in France. This was compensated for by the development of other uses, notably in domestic applications of energy, so that the demand for current continued strong and certain companies announced remarkable progress over the results of the previous year. In the Paris region the four distributing companies produced 2,093,000,000 kw.-hr., an increase of 16.5 per cent over the 1,796,000,000 kw.-hr. produced in 1928. In Paris itself the number of subscribers increased by 7.8 per cent over 1928 and the consumption of current rose by 11 per cent. The augmented power installation was 10 per cent.

In 1928, the most recent period for which energy production statistics are available, France produced a total of 12,976,000,000 kw.-hr., against 11,388,000,000 in 1927 and 7,490,000,000 in 1923. Of the 1928 total, 7,378,000,000 kw.-hr. was from thermic and 5,598,000,000 from hydro-electric energy sources. Taking into account the energy imported from Switzerland and that exported to Switzerland and the Saar, the quantity consumed in France was 13,411,000,000 kw.-hr. in 1928, against 11,794,000,000 in 1927 and 7,723,000,000 in 1923.

The amount of energy consumed per inhabitant was 194 kw.-hr. in 1923, against 288 in 1927 and 330 in 1928, marking a 70 per cent increase in the period. The year 1929 registered a further advance to 372 kw.-hr. During the first eight months of 1930 electrical expansion has continued, although at a more moderate rate than in 1929.

At the end of the war, in 1918, there were 7,000 communes electrified in France. On January 1, 1929, out of 37,981 communes in the ninety departments, 22,479, or 60 per cent, were electrified. The electrified communes contained 83 per cent of the total population of France. In 1929 an addition of 2,935 communes was made to those on the electrified list, and there remain now only 9,000 to 10,000 communes entirely lacking in electrification. The total length of the rural electric distributing system is 300,000 kw. and it is doubling every four years.

The past year broke all records in the French electrical construction industry and activity has been maintained at a high level in 1930. No figures of actual production are available, but the total productive capacity of the French electrical factories in 1929 exceeded a value of 4,000,000,000 francs, or $156,716,000, against 193,000,000 gold francs or $37,200,000, in 1913. Capital invested was 2,500,000,000 francs, or $97,950,000, in 1929, against 300,000,000 francs, or $58,000,000, in 1913. The number of workers now employed is between 90,000 and 100,000.

Wages of workers in the French electrical industry have been raised by 50 per cent since 1926, the year of the *de facto* stabilization of the franc. The index of wages in the electrical industry passed from 182 in January, 1929, to 213 in January, 1930, with a rise of 16.4 per cent, on an index of 100 in January, 1923.

Foreign trade expands

Exports of electrical material and machines from France totaled 453,311,000 francs, or $17,770,000, in 1929 against 420,724,000 francs, or $16,492,000, in 1928, and 374,941,000 francs, or $14,698,000, in 1927. From 1921 to 1927, inclusive, the exports showed a surplus over imports, but in 1928 a deficit of 2,000,000 francs appeared, which increased to 176,000,000 francs in 1929. The principal items in the export trade are electrotechnical machines, dynamos and transformers, insulated wires and cables, electric batteries and lamps. Imports were mainly of the same categories and totaled in 1929 the value of 629,475,000 francs.

Exports of French electrical goods prior to the World War represented one-sixth of the national production, but in 1929 the proportion had fallen to one-tenth. The leading foreign customers of French electrical manufacture are, in the order named, Belgium, Germany, Great Britain, Spain and Italy.

Imports of electrical apparatus into France have shown a substantial increase since 1927. For 1928 the imports were 442,000,000 francs, or $17,326,000, an 82 per cent advance over the totals of the previous year. In 1929 the total rose to 629,000,000 francs, or $27,802,000. The increases were principally in electric generators and motors, dynamos, wire, cables and incandescent lamps, coming mainly from the United States and Germany.

Total shipments of electrical machinery and apparatus from the United States to France in 1928 amounted to $1,406,066, against $1,025,537 in 1927.

Changes in the French tariff schedules have been helpful to the import trade in electrical machines. The commercial treaty concluded August 17, 1927, with Germany gave to the French electrical industry a protection often less than 20 per cent; then the accord of January 21, 1928, with Switzerland, by virtue of the most favored nations clause, gave gratuitously to Germany concessions which had been refused several months before.

German reparation deliveries played a substantial part in the augmented imports. In 1928 these deliveries were valued at only 68,000,000 francs, but in 1929 they reached 132,500,000 francs. Under the Young plan, these deliveries will progressively diminish.

The reorganization pursued for several years in the German electrical industry enables it to furnish material and machines at from 20 to 25 per cent below the French prices. It is realized in French electrical circles that costs of production must be lowered through a rationalization of the industry. Already a beginning has been made as a result of an understanding between manufacturers of electrical material, with the object of centralizing general services, specializing factories, standardizing machines and products, and reducing the number of models.

The progress realized in utilizing sources of energy and the transmission of current over greater distances, with the establishment of interconnecting systems over the entire national territory, offers the prospect of a new diminution of prices for current, and as a result, the more general use of energy and a greater demand for electrical material are anticipated. It is realized, however, that the economic interests of the consuming countries demand a European organization of manufacturers of electrical products. The marked development of the German industry, with American participation, has interested French manufacturers anew in the possibility of an entente, but no definite steps toward its realization have yet been taken.

Specific Benefits of Good Lighting

Increases Production

A bearing manufacturer increased the illumination in his inspection room from 5 to 20 foot-candles. Production jumped from 408 to 458 pieces per operator per hour—an increase of 12.5 per cent.

A piston-ring manufacturer increased the illumination in his plant from 1.2 to 6.5 foot-candles. Production increased 13 per cent. Increasing the light to 9 foot-candles brought another 4.9 per cent production increase. An intensity of 14 foot-candles added 6.9 per cent more to production, making a total increase of 25.8 per cent in production over the old installation.

Decreases Accidents

In a plant employing about a thousand men the average number of accident claims was 425 per year and the compensation paid, $15,000. By spending $2,800 more per year for electric light the accident claims were reduced to 170, saving $6,200 in compensation payments.

Improves Working Conditions

A manufacturer of automobile parts found that his labor turnover decreased from 6.37 per cent per month to 2.78 per cent following the installation of a new lighting system. In addition work was sped up enough to pay for the entire cost of installation in eighteen months.

—*The Electric Journal.*

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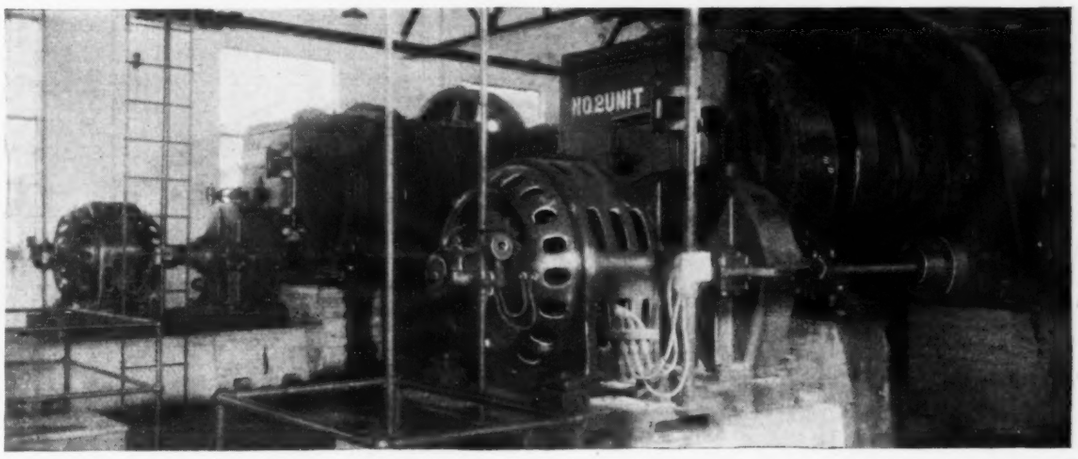
Rod Mill Displaces Pulp Beater

The use of attrition and impact mills for beating and hydrating paper pulp is quite new. To the difficult duty requirement of this drive the synchronous motor is well fitted. Here are two of the three 200-hp., 2,200-volt, 900-r.p.m. synchronous motors made by the Electric Machinery Manufacturing Company, driving Marcy rod mills that replace the old style beaters in the plant of the Nekoosa Edwards Paper Company at Nekoosa, Wis.



Increasing Electric Service i

VARIED and heavy-duty service makes the modern granite quarry an interesting prospect for electric power application. Rapid engineering progress is being made in multi-motor individual driving of special machine tools for molding granite blocks to meet the exacting requirements of the modern building trade.

RUGGED equipment and flexible power distribution contribute their quota to the success of the quarry applications described by Mr. Johnson in this article. Enticing possibilities for further development exist in this industry through the wider use of recording instruments and synchronous apparatus.

MODERNIZATION through the increasing use of electric service is aiding the granite industry to achieve better methods of production and greater efficiency of operation. At Westford, Mass., the quarry of the H. E. Fletcher Company utilizes purchased power in stone cutting, molding, block haulage, hoisting, pumping, stone crushing and small tool operation. Further possibilities are being studied in connection with the electric driving of channeling machines for providing exploratory holes prior to quarrying and the application of electric heat to stone cracking. In this installation chief interest at present attaches to the motor driving of sawing, coping and molding machinery.

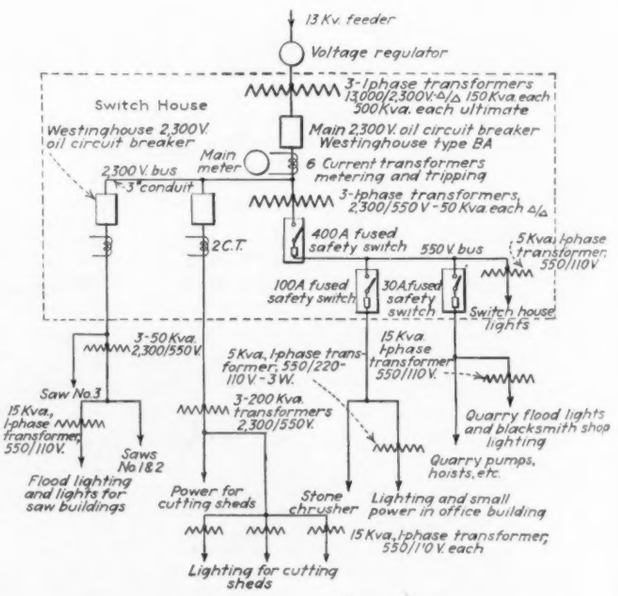
The working area of this quarry presents a chasm more than 10 acres in area and 150 ft. deep, its output being used in major building operations throughout the country. Not only has the form of building construction changed in recent years, demanding what is in reality the veneering of granite over reinforced concrete, but the method of quarrying and the preparation of granite for the market has kept step with modern demands. The quarry contains about 7 miles of standard gage track, over which the material is handled by the company's two locomotives. There are about twenty hoists in service. The company employs an average of 550 persons and its daily shipments of stone frequently reach 150 carloads by rail, in addition to local truckload deliveries. The total connected motor load is now about 750 hp. and the connected lighting load is about 85 kw. A potential motor load to be obtained by the electric drive of air compressors, now steam operated, is computed at 700 hp. Under present conditions the monthly energy consumption exceeds 100,000 kw.-hr., with prospects of a steady increase during the summer months.

Features of distribution system

Energy is supplied to the quarry from a 13-kv. line of the Lowell Electric Light Corporation, a subsidiary of the New England Power Association. It is purchased at 2,200 volts. Motors of over 75 hp. are now being standardized to operate on 2,200-volt service, smaller motors being operated at 550 volts, obtained through transformers owned by the quarry.

In many seasons it has been found necessary to operate a night shift and floodlighting is effectively used under these conditions to serve all operations of the quarry, including cutting sheds, loading yards, saw houses and the main pit.

The incoming energy is transformed to 2,300 volts by a 450-kva. bank of three single-phase units. The ultimate capacity of the bank will be 1,500 kva. The secondaries are connected to a 2,300-volt bus in an adjacent switch house through a three-pole, single-throw circuit breaker equipped with six current transformers for tripping and metering and with two type "CO" relays. The 2,300-volt bus is tapped for two feeders, one to the saw house and one to the cutting sheds. The tap is also provided to the 2,300/550-volt transformer bank outside the switch house for feeding the 550-volt motors used in pumping,


13 Kv. feeder
Voltage regulator
3-1phase transformers 13,000/2,300V-Δ/Δ 150 Kva. each 300 Kva. each ultimate
Switch House
Westinghouse 2,300V. oil circuit breaker
Main 2,300V. oil circuit breaker Westinghouse type BA
Main meter
6 Current transformers metering and tripping
2,300 V. bus
3" conduit
3-1phase transformers, 2,300/550 V - 50 Kva. each Δ/Δ
400 A fused safety switch
550 V. bus
5 Kva. 1phase transformer 550/110V
2 C.T.
100A fused safety switch
30A fused safety switch
Switch house lights
3-50 Kva. 2,300/550V.
5 Kva., 1phase transformer; 550/220-110V - 3W.
15 Kva. 1phase transformer 550/110V.
Saw No. 3
15 Kva., 1phase transformer 550/110V.
3-200 Kva. transformers 2,300/550V.
Quarry flood lights and blacksmith shop lighting
Saws No 1 & 2
Quarry pumps, hoists, etc.
Flood lighting and lights for saw buildings
Power for cutting sheds
Stone chrusher
Lighting and small power in office building
15 Kva., 1phase transformer, 550/110 V. each
Lighting for cutting sheds

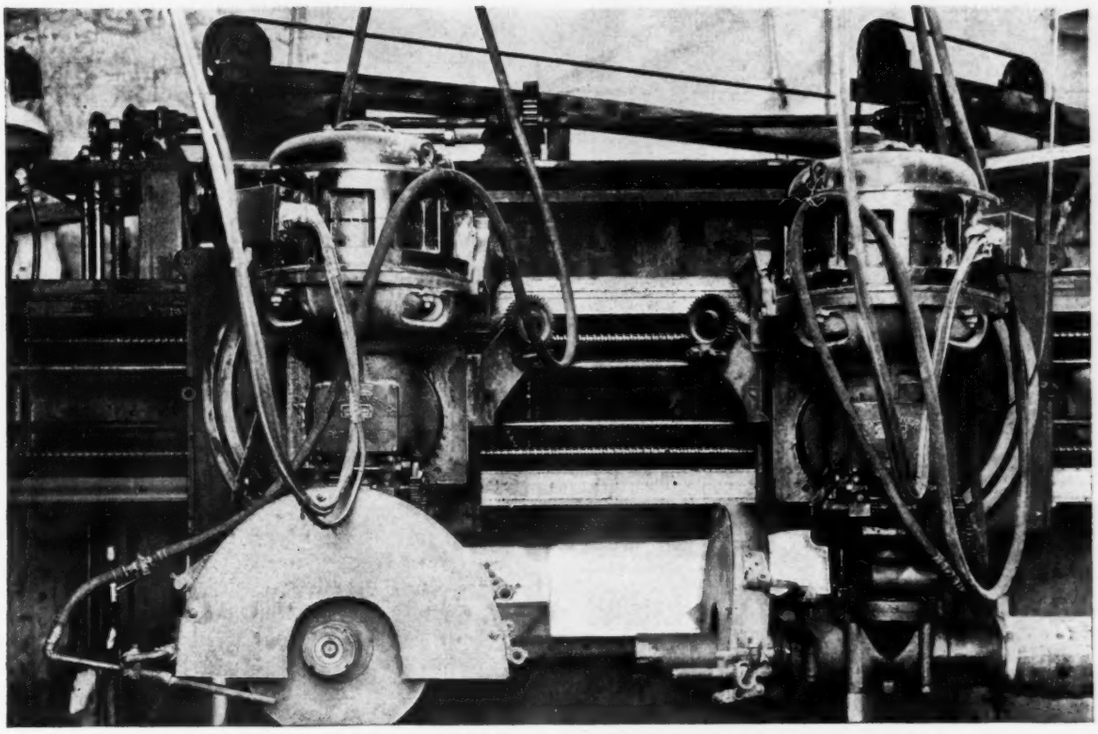
One-line diagram of quarry distribution system

Motors and lighting service are handled by one feeder through an automatic voltage regulator.

in a Granite Quarry

By R. A. JOHNSON

Power Sales Engineer
Lowell Electric Light Corporation,
Lowell, Mass.



Granite coping and molding machine equipped with multi-motor drive gives the flexibility of service of a high-grade metal shaper

hoisting, small power, etc. The two 2,300-volt feeders from the switch house are equipped with oil circuit breakers, but the 550-volt connections from the low side of the transformers at the switch house are protected with fused safety switches. Lighting is taken off the power lines by local transformers as required, using 110-volt and 220-volt energy for illumination and small power. The main power supply is measured from the 2,300-volt side by a Westinghouse "RA" kilowatt-hour meter equipped with a demand recorder which registers at fifteen-minute intervals.

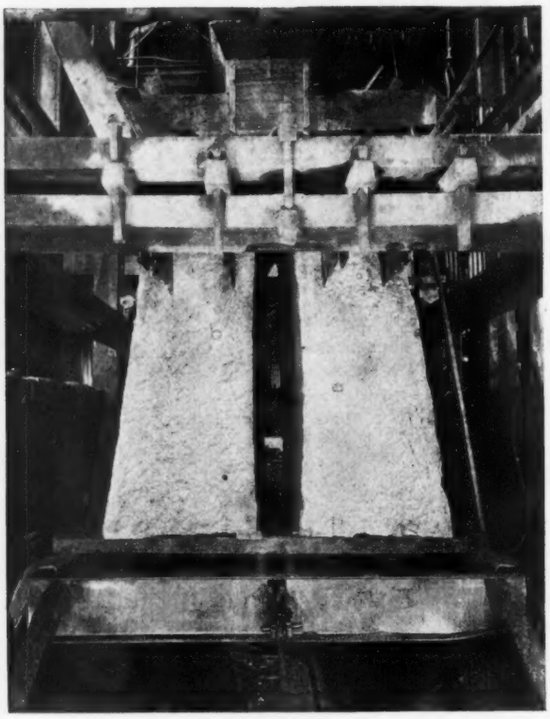
The installation of this type of distribution system was difficult on account of the danger of hoisting equipment interfering with power and lighting leads. This was aggravated by the nature of the work in the quarry, which is apt to grow in all directions, requiring frequent changes and additions to the wiring. The problem was solved by the use of exceptionally high poles and by detouring electrical lines away from possible interference, also by using wooden crossarms and glass insulators to facilitate quick and safe removal.

The problem of voltage regulation, which is usually serious for service of this type, was met by installing a feeder voltage regulator on the 13-kv. line from the Lowell company and by the use, as stated, of 2,300 volts for distribution for the longer feeder lines and larger motors. With the prospect of motorizing compressor drives, there is an opportunity to improve the voltage regulation and power factor by installing 2,300-volt synchronous motors for this service.

Formerly the principal use for electric power in this quarry was in stone crushing, dust removing and water pumping. Granite was formerly hauled out of the quarry by oxen. Derricks capable of handling 30 to 75 tons now load the stone blocks upon flat cars, which are hauled to electrically driven gang saws. These saws are manufactured by the Patch-Wegner Company, Rutland, Vt., and are driven by 50-hp., wound-rotor, variable-speed induction motors. These machines work on the principle of an old-fashioned crosscut saw. Surprising to say, however, the saws are merely ordinary pieces of flat steel, $\frac{3}{4}$ in. thick, fluted. The cutting is done by chilled steel shot, fed to the moving steel blades by mixing with water and pumped over and over with centrifugal pumps operated by 25-hp. motors.

The total load on one of these outfits is slightly more than 75 hp. The actual load on the main motors is determined by the number of cuts being made and the pressure applied to the saws. Ammeters have been installed to check constantly the motor input to enable overloading to be prevented.

The rate of sawing with seven blades in operation is



Motor-driven saw cuts 4 in. per hour in granite block by feeding steel shot to fluted blades under water lubrication

about 4 in. per hour, and with the huge blocks which are quarried the saws are operated from eighteen to twenty hours constantly with one setting of the stone. In the latest installation, to obtain higher cutting speed, the 2,200-volt motors have been increased in rating from 50 to 75 hp.

If it is desired to make building veneering, the slabs received from the crosscut gang saw are taken to the coping and molding machine, where they are cut into proper size blocks and in some cases are grooved to give the appearance of being jointed.

The Patch-Wegner coping and molding machine can be used for a variety of purposes, as a shaper is employed on metal work. The machine has two adjustable cutting heads which may be used independently or, in case of heavy work, as a single unit. Upon each cutting head is mounted a carborundum cutting wheel which is gear-driven by an electric motor at about 2,000 r.p.m. The motors driving the cutting heads are each 75-hp., 550-volt, three-phase induction type.

The transverse travel of the wheels is motor operated and has adjustable speed, while the vertical movement is both power and manually operated. Longitudinal travel is obtained by movement of the power table, which may be shifted approximately 12 ft., and has sufficient capacity to handle a 20-ton stone.

Power to move the table and effect the transverse travel of the cutting heads is obtained from a 7½-hp. variable-speed, belt-connected motor. A 5-hp. motor is used by the operator to draw up the head when a cut has been completed. Since it is possible by taking too heavy a cut greatly to overload the motors, ammeters are installed on the main motor connections so that the motors will be properly loaded, as in the case of the gang saw machines. It is necessary to keep jets of water on the carborundum wheels while the cutting is being done, and it has been found that the wheels will wear concave if a stream is played on each side, convex if no water is used, and uneven if the amount of water used on either side varies too much. The total power requirement of this machine is 162 hp.

The handling of stone blocks weighing on the average about 20 tons each to and from the gang saws is done by a special cable traction machine driven by a 35-hp. motor.

In addition to the saws and new coping and molding machine, there is an older type of molding machine, belt-driven by a 50-hp., wound-rotor, variable-speed motor connected to one of the 550-volt lines. This line, together with the circuits for power and lighting for the stone-cutting sheds, is energized from a local bank of three single-phase transformers, each rated at 200 kva., 2,300/550 volts. The 2,300-volt energy is fed by a line coming from the switch house, as indicated in the diagram. On the same feeder are connected three 20-hp. induction motors for dust collectors at the cutting sheds and a 10-hp. induction motor for driving the fan of the sand-blasting machine. These induction motors are started by compensators and protected by safety switches.

There are two other 550-volt feeders carried directly from the switch house to the plant, one feeding a 100-hp. stone crusher, a 20-hp. conveyor and a single-phase transformer for lights and power in the office building; the second feeder furnishes power in the quarry for a 10-hp. electric hoist, for water pumps taking about 15 hp. and for miscellaneous small motors in the shops.

With these new fields for power consumption in the modern quarry there is an evident opportunity for a greater use of indicating and recording instruments, which would give a detailed picture of the duty cycle of each machine or process and would tend to raise the economy of these applications by isuring the use of the proper size and type of power-consuming device in each particular location.

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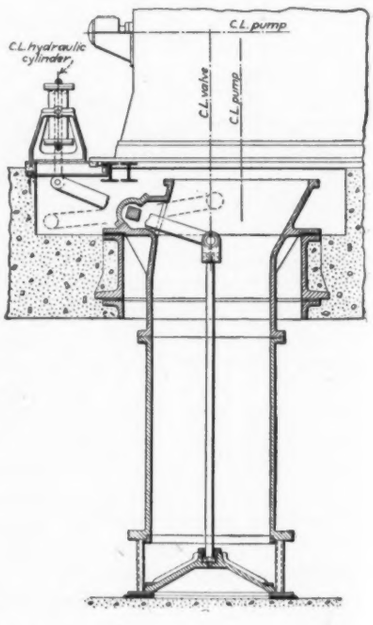
Cone Valve Saves Space

To install the usual gate valve in the circulating water intake of the last unit at the Colfax plant of the Duquesne Light Company, Pittsburgh, Pa., would have been a difficult matter on account of the restricted space available. A hydro-cone valve of simple design not only supplied an easy solution of the problem, but permitted a considerable shortening of the suction length in the circulation system.



Comparative 1928 Service Statistics for Hydro and Steam Units

		Hydro Units						
				Reaction				
		Propeller	Impulse	Vertical	Horizontal	Total	Total	Steam Units
1	Number of units included	12	16	154	9	163	191	207
2	Average generator rating, kw.	18,533	16,609	15,643	11,772	15,429	15,723	32,700
3	Service time, per cent	87.99	85.21	74.32	85.04	74.91	76.60	66.88
4	Idle time, per cent	12.01	14.79	25.68	14.96	25.09	23.40	33.12
5	Outage time, per cent	8.46	3.33	3.16	3.44	3.18	3.52	9.69
6	Outage time when in demand, per cent	2.11	0.11	0.67	2.03	0.75	0.78	2.74
7	Outage time when not in demand, per cent	6.36	3.22	2.49	1.41	2.43	2.74	6.95
8	Reserve time, per cent	3.55	11.46	22.52	11.52	21.91	19.88	23.43
9.	Demand time, per cent	90.09	85.32	74.99	87.07	75.66	77.38	69.62
10.	Maximum possible service time, per cent	91.54	96.67	96.84	96.56	96.82	96.48	90.31
11	Capacity factor, per cent	65.20	59.95	51.18	58.19	52.23	53.14	46.62
12.	Output factor, per cent	73.96	70.96	70.42	67.56	70.26	70.55	69.71
13.	Service demand availability factor, per cent	97.03	99.89	99.18	97.77	99.10	99.07	96.06

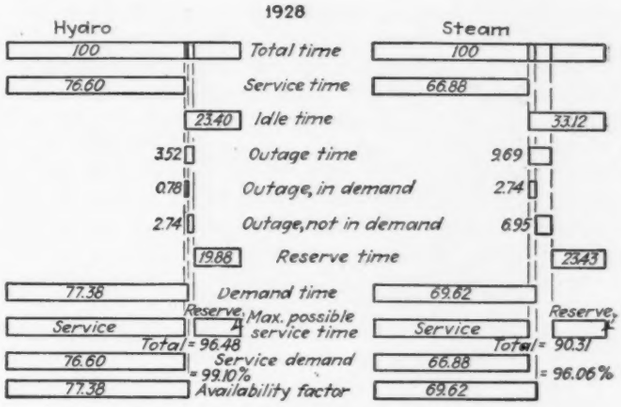
Hydro Plant Outage One-Third that for Steam

OUTAGE time for hydro-electric power plants is only slightly over one-third that for steam plants, the former being 3.52 per cent and the latter 9.69 per cent for 1928, according to a report of the hydraulic power committee of N.E.L.A.

Waterwheels and their auxiliary apparatus give the major part of the trouble which cause hydro outages, with generators and their appurtenances and general hydraulic causes following in the order named. Runner troubles are the main cause of the waterwheel shutdowns. More trouble is experienced in the first year of operation than in any one succeeding year.

Of the 191 turbines which were covered in this year's report on hydro plants, 154 were the vertical reaction (non-propeller) type, having a total rating of 3,351,900 hp.; nine were of the horizontal reaction type, having a total rating of 158,400 hp.; sixteen were the impulse type, with a total rating of 390,000 hp., and twelve were propeller turbines, having a total rating of 302,000 hp. The grand total rating is 4,202,300 hp., or an average rating of 22,022 hp.

Of the associated generators, 166 were vertical, with a total rating of 2,631,410 kw., and 25 were horizontal, with a total rating of 371,700 kw., or a grand total rating of 3,003,110 kw.



Hydro-electric units more reliable than steam plants

The outage time percentages shown here are slightly unfavorable to the steam units, in that outages due to outside electrical causes and to plant electrical causes beyond the generator and its exciter have been included in the steam tabulation and excluded from the hydro-electric one. However, the combined outage time from these causes is less than 0.2 per cent.

The range of head has been extended both upward and downward by the installation of two impulse units designed for a head of 2,563 ft. and of two propeller units for heads of 35 ft. The head for impulse units ranges from 1,108 to 2,563 ft., and for reaction units (including propeller units) it is 35 to 909 ft.

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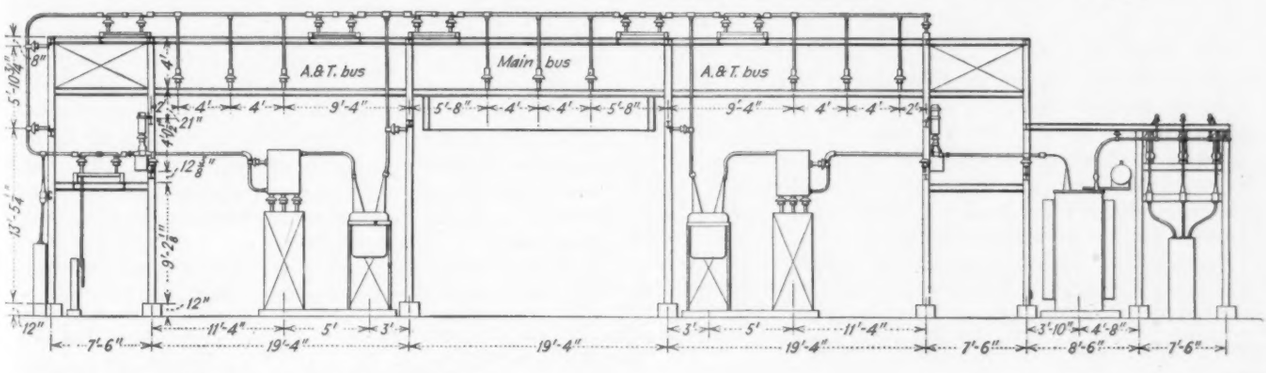
Extends Use of Copper Tubing to Minimize Insulators

Section of 13.8-kw. switching station at Belle Isle generating plant of Oklahoma Gas & Electric Company



READERS' FORUM

Super Safety Not Demanded by National Code

To the Editor of the ELECTRICAL WORLD:

My attention has been drawn to the remarks of J. F. Gilchrist concerning the National Electrical Code and Underwriters' Laboratories as reported in the ELECTRICAL WORLD for September 20, 1930.

It would be interesting to know just what portion of the national code and what laboratory standards Mr. Gilchrist refers to when he speaks of "securing a high degree of super safety without regard to the cost of materials." My experience as an electrical inspector would lead me to just the opposite conclusion, to wit: That the National Electrical Code is right down to bedrock as far as minimum standards of safety are concerned. No person who has made a serious study of the national code can reasonably say that it specifies needless requirements or demands a "high degree of super safety." In fact, if the truth be known, the National Electrical Code was until very recently so inadequate that many cities found it necessary to legislate beyond the code to secure a proper standard of wiring. Not only this, but they have been assisted in many instances by the more progressive utility companies, particularly those located in states west of the Rocky Mountains.

Criticism, if it is to be of value, must be constructive. Criticism which is not constructive can do more harm than good. Those who condemn our present wiring standards as too restrictive have so far offered no practical solution of the problem. True, it has been suggested that the code be confined to basic fundamentals of safety rather than detailed methods of complying with such fundamentals. One might as well set a sailor, untrained in the art of navigation, adrift in midocean equipped with chronometer and sextant as to turn the average contractor or wireman loose with a code of fundamentals. Even though we assume a degree of training and intelligence much above the average, the highly competitive conditions which exist today would surely and swiftly bring about a very deplorable and chaotic condition of affairs which could not long be tolerated.

If it is the desire of the National Electric Light Association to do away with uniform national standards for interior wiring, I know of no quicker way to accomplish this than to eliminate needed detail from the National Electrical Code. I am sure the electrical industry as a whole is wholeheartedly in favor of a uniform national code, and during the past few years much has been accomplished toward the elimination of arbitrary and varying local rules. It would be very unfortunate if one group in the industry should at this crucial time retard progress in this direction by promulgating a more or less visionary code of fundamentals.

Recently in a political speech one of the Oregon gubernatorial candidates was vigorously extolling the benefits of public development of water power. He said, in part: "In my journey over the state I have been greatly impressed by our wondrous rivers and streams, fragrant with power, running idly to the sea." One may smile quietly at this remark, but there is a close parallel in the attitude of certain representatives of the N.E.L.A. and that of the politician. The former are obsessed with one thought, to wit: That the purpose of interior wiring is to carry current from the meter, where it is measured, to the lamps and electrical devices where it is used. If the lamps light, devices heat and motors whirl, they contend that the wiring has served its purpose. They somehow overlook the fact that this result cannot be accomplished safely without a reasonable expenditure. The politician, on the other hand, is concerned only with the fact that streams and rivers are "fragrant with power," which can, with negligible expense, be turned into power to light cities and furnish power to farms and industries to the benefit of his constituents.

We might excuse the politician for certain errors in judgment, knowing that he is probably ignorant of the cost of developing, transmitting and distributing power, as well as of the problem of marketing. It is not so easy, however, to justify the attitude of utility leaders, whose training and experience should promptly enable them to judge the value of standards and realize that standards which have required over a quarter of a century in their development cannot be thrown aside overnight in favor of untested and possibly unsound theories.

In this consideration of the oneness of the electric circuit from power plant to lamp socket let us have more co-ordination between the different branches of the industry and less disregard of each other's interests. In this way only can we keep pace with the rapidly developing art.

L. W. GOING.
Chief Electrical Inspector, City of Portland.
Portland, Ore.

Uniform and Simple Rates to Please the Customers

To the Editor of the ELECTRICAL WORLD:

While reading the excellent editorial entitled "Uniform and Simple Rates" in the October 11 issue, it occurred to us that much antipathy to present rate schedules might be overcome by establishing definite demand and energy charges for all classes of service and multiplying them by suitable factors. The latter would, of course, be based on considerations similar to those employed in establishing present rates, but it is thought the plan might exert a more favorable psychological effect on the public.

If, for example, users were charged a dollar per kilowatt of demand and a cent per kilowatt-hour of energy consumption, is it not reasonable to believe they would be inclined to overlook the use of certain multipliers and to feel they were being billed on a more equitable basis? Since the public is accustomed to think and argue in terms of dollars and cents, rather than in other mathematical terms, would not the plan tend to deprive the average chronic objector of his customary line of argument?

Perhaps the plan might fail to simplify the billing, but the bill should appear simpler to the customer.

E. A. Wilcox Company,
San Francisco.

E. A. WILCOX.

Men of the Industry

John Collins Assumes New Engineering Duties

JOHN COLLINS, JR., for the past several years vice-president and chief engineer of the United States Engineering Corporation in the New York offices, has recently been appointed chief engineer for Standard Management & Operating Corporation, San Francisco, Calif.,

according to an announcement made by officials of that company.

Mr. Collins will be in charge of all construction and engineering enterprises performed by the management company for Pacific Public Service Company, its subsidiaries and for all clients of the company. He will also act in an advisory capacity regarding operations in properties now controlled by Pacific Public Service.

A major expansion project involving the electric transmission and distribution systems of Coast Counties Gas & Electric Company, a subsidiary of Pacific Public Service Company, serving an important area in west central California, is being designed and will be executed under Mr. Collins' direction.

Previous to holding the position of vice-president and chief engineer of the United States Engineering Corporation, Mr. Collins held similar positions with other large public utility enterprises in the East, including the National Public Service Company, for which he superintended the construction of extensive transmission and substation projects, as well as several large steam and hydro-generating stations.

Other organizations with which he has been associated include the Brooklyn Edison Company, American Sugar Refining Company, Public Service Production Company of New Jersey and the General Engineering & Management Corporation. Mr. Collins was also assistant chief engineer of the J. G. White Management Corporation.

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A. W. BASS was recently appointed director of budgets by F. A. Merrick, president of the Westinghouse Electric & Manufacturing Company. Formerly Mr. Bass was assistant to the vice-president, in which position he was director of works records and statistics.

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W. F. SIMS has been appointed engineer of inside plant of the Commonwealth Edison Company, Chicago, according to an announcement made by R. F. Schuchardt, electrical engineer of the company. The appointment will be effective December 15. Since October, 1929, Mr. Sims has been discharging the duties of this position in the absence of B. G. Jamieson, who at that time embarked on a trip around the world on a year's leave of absence. Mr. Jamieson has decided to remain abroad and for the present will make his home in Paris, France. Mr. Sims has been prominently identified with the work of the engineering section of the National Electric Light Association and the American Institute of Electrical Engineers. He was graduated from Armour Institute of Technology in 1897. After four years with the Chicago Telephone Company he entered the engineering department of the Commonwealth Edison Company, where he remained for five years. Then he became identified with the Board of Supervising Engineers following the Chicago Traction settlement in 1907, which unified the operation of surface lines in the city. During five years with the Stone & Webster Engineering Corporation he was identified with important work on the Boston Elevated System and in the construction of the Keokuk project on the Mississippi River. After a short time as an independent consulting engineer he returned to the Commonwealth Edison Company in 1916, working up through responsibilities in connection with the design of railway substations and generating stations to his present position.

R. V. Wright New President of A.S.M.E.

ROY V. WRIGHT, the new president of the American Society of Mechanical Engineers, has rounded out 32 years of progressive service in the railway-mechanical industry. He is best known as managing editor of *Railway Age*, though before entering upon his edi-

torial career in 1904 he had many years of practical engineering experience in the transportation field. For many years he has been an active figure in the affairs of the society which he has just been selected to head, having served on various committees of that body and having contributed numerous papers to its proceedings.

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RALPH B. FEAGIN, vice-president of the Electric Bond & Share Company and president of the United Gas Corporation, has been elected a director of the Bank of America National Association.

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LEONARD W. CRUMP has been appointed assistant sales manager of the southwestern district of the Puget Sound Power & Light Company to succeed H. R. Kruse, who has been transferred to the eastern district. A graduate of the University of Washington, Mr. Crump has been associated with the Puget Sound utility since 1925.

Three Lawrence Heroes Awarded Medals

FOR THE FIRST TIME in Massachusetts, three president's medals were awarded in Lawrence, November 20, by the National Safety Council to three employees of the same company and in the same department, but for rescues on three different occasions. President Fred H. Sargent of the Lawrence Gas & Electric Company, in behalf of the National Safety Council, presented to Albert L. Deggs, assistant superintendent; Daniel J. Donoghue, fireman, and Ernest A. McComiskey, power station operator, bronze medals and certificates commemorating their acts of outstanding bravery in saving a human life.

Mr. Deggs was awarded the medal for saving the life of Thomas Wilson, who was found in a dying condition after having been overcome by carbon monoxide gas. Mr. Donoghue's award was for participation in saving the life of thirteen-year-old Margaret Martin from drowning in Stevens' pond, North Andover, and Mr. McComiskey is credited with having saved the life of Clifford Jackson, who was overcome by ammonia fumes from a refrigerating machine in the basement of a restaurant where he was employed.

The Lawrence Gas & Electric Company, a part of the New England Power Association, has had many of its employees honored for heroic life-saving work, but this is the first time in the existence of that company that three employees had the honors conferred simultaneously.

Daniel J. Donoghue — Ernest A. McComiskey — Albert L. Deggs

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E. A. HESTER, planning engineer of the Duquesne Light Company, has been appointed vice-chairman of the National Electric Light Association power systems engineering committee. Mr. Hester has served as a member-at-large of this committee since it was formed in 1928 and has also held membership on three of its subcommittees, namely, interconnection and system operation, load and revenue forecasting and transmission substations. He has been closely identified with the development of the Duquesne Light system for the past five years and prior to that time he had experience of the same kind with the Brooklyn Edison Company in New York.

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F. D. NEWBURY, former manager of the power engineering department of the Westinghouse Electric & Manufacturing Company, has been appointed general manager of machinery engineering. Mr. Newbury has been with the engineering department since 1903. Succeeding Mr. Newbury as manager of the power engineering department is R. A. McCarty. Previous to his promotion, Mr. McCarty had been division engineer in the department of which he is now the head.

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W. RALPH CARLYON, who has been lighting engineer in the Jackson district of the Consumers Power Company for more than three years, has been transferred to the Lansing district, where he will be in charge of security sales.

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FLOYD D. AVIS has been appointed manager of the Jackson (Mich.) district of the Consumers Power Company to succeed Howard Pett, who has transferred his interests to Lansing. Mr. Avis became identified with the organization as assistant general manager of the Southern Michigan Light & Power Company when that property was taken over by the Consumers Power Company in 1926. During the past year, when the Southern Michigan Light & Power Company went out of existence as a separate company and was absorbed as part of the Consumers Power Company system, Mr. Avis took over the direction of rural development work for the latter organization, in addition to his work as supervisor of the operation of the State Line district of the company, in which was incorporated a large part of the old Southern Michigan system.

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OBITUARY

WILLIAM B. D. DANA, electrical engineer and inventor, was drowned December 6 near Marblehead, Mass., while duck hunting. He was 39 years of age. A graduate of Harvard University, Mr. Dana was formerly associated with the General Electric Laboratories at Lynn. Recently he was engaged in the manufacture of oil burners.

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ANDREW M. HUNT, consulting engineer, died in Berkeley, Cal., December 8, in his seventy-second year. A graduate of the Naval Academy at Annapolis, Mr. Hunt became known in the engineering field, both electrical and mechanical. After resigning from the navy, Mr. Hunt opened offices in San Francisco as a consulting engineer, but in 1915 he removed to New York, where he headed the firm of Peyton-Hunt Company, Inc. In 1917 he was appointed, along with Thomas A. Edison and other scientists, on the Naval Consulting Board. Mr. Hunt was a member of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Consulting Engineers, the American Electrochemical Society and other technical associations.

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ROMIE W. WILSON, district manager of the Manchester district of the Public Service Company of New Hampshire, died at the Elliot Hospital, Manchester, November 29, after a serious operation. Mr. Wilson was one of the oldest employees of the company in point of service, having been connected with this company and its predecessors for about 30 years. He gained prominence in the public utility field through his associations with the Manchester Traction, Light & Power Company, acquired four years ago and organized into the Public Service Company of New Hampshire. He was for many years superintendent of construction and through a merited promotion became assistant manager of the organization. Mr. Wilson resigned the position to become vice-president and manager of the Grafton County Electric Light & Power Company, operated by Tucker, Anthony & Company of Boston, and established headquarters at Lebanon. In 1926 the Public Service Company of New Hampshire came into existence, and the following year Mr. Wilson became manager of the Manchester district.

Financial and Statistical News

BOND prices again reached new low ground this week. The average yield on a representative group of utility bonds is approximately 5 per cent, against 4.5 per cent at the beginning of 1930 and 3.9 per cent in the middle of the year.

——IN ADDITION TO GENERALLY REDUCED BUYING POWER and the effect of stock market behavior, a factor in the bond weakness undoubtedly is the unusually heavy total of new bond issues floated this year. Utility mortgage bond issues for the year will exceed $500,000,000, against $215,000,000 in 1929.

——UTILITY COMMON STOCKS NOW AVERAGE ONE-THIRD of their top prices and are almost parallel to the 1929 lows. A representative group of New York Stock Exchange common stocks average 52, against 53 after the break last fall and 159 at the top. Several issues were marked down to new low prices again this week.

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Middle West Utilities Joins Billion-Dollar Group

ACCORDING TO THE Manual of Securities recently issued by the Middle West Utilities Company, that system joins the billion-dollar group of American business organizations. The net amount of securities of Middle West Utilities Company and subsidiaries outstanding in the hands of the public is $1,119,717,011 as of June 30. This is an increase of $224,315,520 over June 30 last year. The acquisition of two major groups of utilities, together with heavy construction to meet growing service demands, accounts for the increase, according to Martin J. Insull, president.

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Power Industry Maintains Slight Lead Over 1929

REVENUE OF ELECTRIC light and power companies continues to exceed slightly that of corresponding months in 1929, according to returns received by the ELECTRICAL WORLD. A preliminary analysis of October revenue based on reports from two-thirds of the industry shows it to be 0.5 per cent in excess of last year's for the same month. At this rate the month's revenue for the whole industry will approximate $183,400,000, against $182,500,000 in October, 1929. September earnings, $174,400,000, were exceeded by 5 per cent. This parallels the corresponding increase last year; it falls 1 per cent short of the normal rise from September to October.

As in September, the most important gains came in the Middle Atlantic States, which had a rise of 2.7 per cent compared with 1929, the South Atlantic, approaching 4 per cent, and the Pacific, with 2.5 per cent. The Middle Western industrial region continues to earn less than in 1929, as was to be expected, but even here the difference is only 4.8 per cent; New England is down 1.8 per cent.

Energy sales in most sections were either level with last year's or increased somewhat. The chief exception was again in the East North Central States, with a decrease of 7 per cent.

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Recent Listings

The New York Stock Exchange has authorized the listing of 309,826 additional shares of common stock (no par value) of the American Power & Light Company on official notice of issuance and distribution in payment of a stock dividend, making the total amount applied for 2,999,957 shares.

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The Boston Stock Exchange has authorized the listing of first and refunding mortgage gold bonds of the Portland General Electric Company to the amount of $40,000,000. These 4½ per cent securities are dated September 1, 1930, and mature September, 1960.

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Arkwright Discusses Write-Up in Property Values

MUCH light was thrown on the process of acquiring additional properties in the utility field and of dealing with their valuation thereafter by P. S. Arkwright, president of the Georgia Power Company, before the Federal Trade Commission last week. Mr. Arkwright voluntarily discussed the details of the transaction whereby Southeastern Power & Light Company acquired additional properties.

It was pointed out that the Georgia Railway & Power Company had been organized in 1912 and that its owners were in no way connected with the owners of Southeastern Power & Light Company. When, therefore, the Southeastern group decided to buy the Georgia Railway & Power properties it was necessary to pay the price asked by the sellers, taking account of real estate value appreciation in the period. There was no listed stock controlling the situation. The Southeastern Power & Light Company, however, did buy a small amount of Georgia Railway & Power stock, probably 7,000 shares out of 250,000 shares, at prices ranging up to $150 a share. Southeastern agreed to buy the control stock from its owners and to pay them for it 1.633 shares of the participating preferred stock of the Southeastern Power & Light Company and one share of the Southeastern common for each share of the common stock of Georgia Railway & Power Company.

Southeastern Power & Light Company entered on its books as the stated value of the stock in the Georgia Railway & Power Company the equivalent of $230 per share. The consideration paid for it was the no-par stock of Southeastern Power & Light Company. Southeastern took no commissions on the transaction. Southeastern Power & Light Company thus acquired Georgia Railway & Power Company and other electric properties in the State of Georgia and their consolidation added value beyond the sum of the value of the individual companies, it was stated.

Furthermore, acquisition of the Georgia Railway & Power Company by Southeastern Power & Light Company,

already owning and controlling the Alabama Power Company, added value to the Georgia Railway & Power Company and also added value to the Alabama Power Company, because it would result in a more economical and more efficient utilization of the generating stations and other properties of the Alabama Power Company and of the Georgia Railway & Power Company by co-ordinating their use. In some cases the combination of the properties on a common ownership permitted the shutting down of uneconomical steam plants and the substitution of the larger and more economical steam plants of another company. It also saved much freight on coal from mine to plant.

Other advantages arise out of the different watersheds of the Alabama and Georgia properties, which is discussed elsewhere, as well as the difference in the time element between Eastern and Central standard time, which reduces the maximum load of the system very materially.

Write-up based on added value

Thus it is apparent that the so-called write-up of $28,000,000 previously referred to in the hearings was not a mere injection of water into the property, but was based upon sound consideration of increased value.

Financing problems provide another angle on the situation. Georgia Railway & Power Company had served a very restricted area. It had no rural lines of any kind. The bonds under its mortgages were entirely exhausted. It had a series of mortgages with a stated interest rate on its bonds running as high as 7 per cent and preferred stock carrying dividends as high as 8 per cent. This is true also in the case of several of the other properties. They were not in a position to raise immediate capital to carry out an expanded and improving program in their existing situation. Furthermore, they did not have adequate generating capacity.

When Southeastern Power & Light Company acquired the Georgia properties it brought about the consolidation of various properties and straightway called and paid off all or most of the bonds of the Georgia Railway & Power Company. It issued a new mortgage unlimited in amount, or an open-end mortgage, on all the properties.

Furthermore, it brought to the property engineering talent of greater and wider experience; it brought management, skill, ability and experience; it brought, also, aggressiveness and enterprise in pushing the business of the company. As a result the property now serves about 400 cities, towns and communities in the state of Georgia. It has extended transmission lines practically all over the state. It has vastly improved the service as rendered formerly by Georgia Railway & Power Company. The 1927 drought, which was similar to that of 1925, was passed without any inconvenience to customers. Rates have been reduced continuously, the total reduction being something over $3,000,000 to date, In 1930 alone it was over $2,000,000. Rates are now uniform throughout the state.

System has elasticity

Likewise, there is elasticity in the system. There is an adequacy of capacity of such a nature that in any place in the State of Georgia reached by these lines can be located an industry of any size, which, on a separated service, would be utterly impossible to provide. Another factor in the increased valuation was that the Georgia Railway & Power Company in the Southeastern system was the key for the interconnection. So to make the capacity of the Alabama Power Company available in times of drought in Carolina or to make Muscle Shoals, for example, available for use over the Southeastern territory, Georgia Electric & Power Company was essential to the situation.

Southeastern Power & Light common stock had reached $140 within 2½ years after it had acquired Georgia Railway & Power Company stock. The participating preferred stock had been exchanged for $6 dividend preferred stock of the Commonwealth & Southern Corporation. That stock has sold recently as high as $104 a share. In the transaction referred to above it was stated on the books of the Southeastern Power & Light Company to have value of $80 per share. This value would have made the 1,633 shares of stock worth $130. According to Mr. Arkwright, "Even on the statement made here that the average value of the common stock of the Southeastern Power & Light Company during the year 1926 was $31, I believe that would make $161 on that basis for the no-par value of common stock that the Southeastern Power & Light Company paid as a consideration for its purchase." Mr. Arkwright continued: "If the value of the common stock of the Southeastern Power & Light Company may be said to have been overstated on its own books, I should think it would be likewise open to suggestion that the value of the preferred stock was understated on its books. Subsequent events, I think, demonstrated that it was so understated."

"But if its value were $100, then there would be $32 additional received or paid for the stock of the Georgia Railway & Power Company; that is, $20 times 1.633, which, as I make it, is at least $32, which would be at least $193 as the reasonable value of the no-par stock of the Southeastern Power & Light Company paid for the stock.

"If any consideration is given to the subsequent increase in the market value within a short period of time of the common stock of the Southeastern Power & Light Company, it would justify at least the stated value of $230 for the 1.633 shares of preferred stock and the one share of common stock of the Southeastern Power & Light Company.

"Southeastern Power & Light Company sold its basket of securities in the properties in Georgia to the constituent Georgia Power Company in 1926 at exactly the stated value on their own books, and stated value on the books of the constituent Georgia Power Company for this basket of securities is exactly the same as the stated value on the books of the Southeastern Power & Light Company. So that no profit was taken by the Southeastern Power & Light Company in the transfer of these securities to the Georgia Power Company in 1926."

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NEW CAPITAL ISSUES

Toledo Light & Power Company made an offering of 5 per cent secured gold notes amounting to $35,000,000, the price being 99½ and interest, yielding over 5.25 per cent. These securities, dated December 1, 1930, will mature December 1, 1932.

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Collateral trust sinking fund gold bonds, series A, of the Canada Northern Power Corporation, Ltd., have been offered to the sum of $2,000,000, the price being 90½ and accrued interest to yield over 5.75 per cent. Proceeds from the sale of this additional issue of series A bonds will be used for the corporate purposes of the company, including the reimbursement of the treasury for advances to subsidiary companies for capital expenditures already made.

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Illinois Companies to Merge

APPLICATION has been made to the Illinois Commerce Commission by the Rockford Gas Light & Coke Company for authority to purchase the St. Joseph-Oakwood Electric Company and five other utilities serving 40 or more towns in the St. Joseph (Ill.) district. The companies seeking authority to dispose of their properties are: Rockford Electric Company, Illinois Public Utility Company, Emden (Ill.) Water, Light & Power Company, St. Joseph-Oakwood Electric Company, Rural Gas Supply Company and United Fuel Transportation Company, Chicago.

The merged utilities, representing a

twenty-million-dollar corporation, will be organized into a new subsidiary under Central Public Service Corporation and headquarters will be established in Rockford. Present officers of the various utilities outside Rockford will be retained, but it is expected a new general manager for the group will be appointed.

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Bonbright Study of Regulation Issued

A STUDY OF THE chief powers and jurisdiction of public utility regulatory commissions in the various states was published recently by Bonbright & Company. The current issue of the booklet is the second edition, the first edition being prepared in December, 1928.

In addition to containing an outline of all state regulations on utilities, with particular reference to electric power and light and gas, the analysis contains a chart giving the chief phases of utility regulation on which the commissions are given jurisdiction.

The analysis states: "The past year has been one in which many attacks have been made by politicians and publicists on the operation of the state public utility commissions. It is, however, interesting to note that, almost without exception, the critics of the commissions have agreed that the system of regulation of utilities by state commissions is a better system than any alternate which has been suggested. Both advocates and critics agree that emphasis should be placed on the effort to strengthen the powers of the commissions."

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NEWS BRIEFS

The Massachusetts Department of Public Utilities has approved the petition of the Electric Light & Power Company of Abington and Rockland for authority to issue additional capital stock of the par value of $236,250. In approving the new issue the commission requires that the shares be issued at par, $25 per share.

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Directors of the Utilities Power & Light Corporation have declared a dividend of 65 cents per share on the class A stock, payable Jan. 2, 1931, to holders of record December 5, 1930. They also declared a dividend of 27½ cents per share on the class B and common stocks, payable January 2, 1931, to holders of record December 5, 1930. With the extra dividend of 15 cents per share on the class A stock, the total payment for 1930 on this class of stock will be $2.15 per share, as compared with $2 per share paid in 1929. With the increased payment of 2½ cents a share on the class B and common stocks, the total 1930 dividend on each of these stocks will amount to $1.02½, as compared with $1 paid for the full year of 1929.

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At a meeting of the stockholders of Puget Sound Power & Light Company, held in Boston December 1, it was voted to increase the authorized common shares to 2,000,000 and the authorized preferred shares to 500,000. In addition, directors of the company have offered rights to common-stock holders for the purchase of additional new common stock at $25 per share in the ratio of five new shares for each eight held.

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Middle West Utilities Company announced that on November 20 the company had 82,042 stockholders, an increase of 29.9 per cent since January 1. This gain was accompanied by a gain in the number of customers served, the present total of 1,731,114 comparing with 1,509,380 a year ago.

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Billion-Dollar Budget Projected for 1931

THAT the power and light companies will spend around $1,000,000,000 in 1931 for construction and improvement of plant and equipment was predicted by Floyd L. Carlisle, chairman of the Niagara Hudson Power Corporation. Details of his statement appear on page 1079. A few of the leading utility systems have already announced their budgets for the coming year.

Detroit Edison Company, for example, has indicated through A. C. Marshall, vice-president and general manager, that at least $13,000,000 will be spent for new construction work during 1931.

Assurance that public utilities in Massachusetts are planning to spend $20,000,000 in 1931 on construction work has been given to the state emergency employment committee. This information was furnished by Charles L. Edgar, president Edison Electric Illuminating Company of Boston; A. B. Tenney, Suburban Gas & Electric Company; H. E. Duran of Greenfield, president of the New England Division of the National Electric Light Association; H. U. Green, Associated Gas & Electric Company; Frank C. Comerford, president New England Power Association; William Phillips, regional director of the New England division of President Hoover's unemployment committee, and Frank G. Nichols, R. W. Bowdoin and Chairman James J. Phelan of the Massachusetts committee.

While the 1931 budget of North American Company has not yet been made public, President Frank L. Dame is reported to have said that construction this year has proceeded at a more rapid rate than was forecast at President Hoover's conference a year ago. The 1930 budget for the entire system was then placed at $57,000,000.

In order to help the unemployment situation, Matthew S. Sloan, president of the New York Edison System, announced recently that an additional appropriation of approximately $5,000,000 has been voted by the Brooklyn Edison Company for extending its underground distribution system in order to keep more than 2,000 employees at work. The bulk of this work will be done in three sections—upper Bushwick, East New York and Brownsville.

"The program of changing from overhead to underground distribution laid out in Brooklyn for this year is practically completed," said Mr. Sloan. "Winding up of this work would have meant laying off about 2,400 temporary employees. In view of the serious unemployment situation, we decided to go ahead with this additional work, which had been scheduled for about the middle of next year. We are glad to be able to do this now so that these men will not have to be laid off.

"Our operating expenses and construction expenditures for the first ten months of the current year have amounted to more than $140,000,000. Most of this was spent in New York City."

Plan of Insull group

Contributions in the total sum of $660,000 for unemployment relief in Illinois to be made by the employees, officials and corporations of the Insull group of public utility properties have been pledged to the relief fund of the Governor's unemployment commission.

An announcement to this effect was made by the commission last week. Also, it was announced that of the total sum, $300,000 was pledged in behalf of the employees and officials of the group, $300,000 in behalf of the companies and $60,000 in behalf of Mr. Insull personally.

In addition to this sum pledged to the commission's $5,000,000 fund, the personnel of the Insull group of companies have undertaken to relieve the distress of all former employees of the group, caused by unemployment, without outside assistance.

Business News and Markets

American Brown Boveri Earnings Well Maintained

ALTHOUGH ORDERS BOOKED by American Brown Boveri Company, Inc., for the twelve months ended November 1 showed a drop of almost 20 per cent, gratifying progress was made during the year in the growth of net income of the company. Unfilled orders as of November 1 of American Brown Boveri and Condit Electrical Manufacturing Corporation, wholly owned subsidiary, were $1,600,000, against $2,000,000 a year ago. A survey of the consolidated balance sheet of the electrical subsidiary shows a ratio of current assets to current liabilities of approximately 14 to 1, against about 5 to 1 a year ago. There are no funded debts or bank loans.

It is understood that the plants of the company are busy on several large contracts for mercury-arc rectifiers and transformers for railway electrification and power developments. Several large steam-driven turbo blowers were built for the steel industry during the year.

American Brown Boveri Company, Inc., it will be recalled, was organized early in 1929 as the electrical subsidiary of American Brown Boveri Electric Corporation. It took over operations at Camden, N. J., as well as the Condit Electrical Manufacturing plant in Boston. At the Camden plant a three-year development program is under way to meet requirements in the utility and railway fields principally. The company is licensed to use patents and designs of BROWN Boveri Company, Inc., Baden, Switzerland.

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N. E. M. A. Elects New Section and Group Officers

NEWLY ELECTED OFFICERS of the National Electrical Manufacturers' Association include the following section chairmen:

Armored conductor and metallic flexible conduit section—H. N. Otis, Anaconda Wire & Cable Company. Electric water heating section—C. G. Hillier, Westinghouse Electric & Manufacturing Company. Electric range section—A. L. Lindemann, A. J. Lindemann & Hoverson Company. Electric welding section—E. D. Bransome, Wilson Welder & Metals Company.

Electric measuring instrument section—F. G. Vaughen, General Electric Company. Fan motor section—E. L. Barkhouse, Emerson Electric Manufacturing Company, Inc. Floodlighting section—A. F. Hills, Crouse-Hinds Company. Fuse section—O. H. Van Amburg, General Electric Company.

High-voltage insulator section—K. A. Hawley, Locke Insulator Corporation. Industrial control section—F. W. Magin, Square D Company, Industrial Controller Division. Industrial lighting section—G. J. Henry, Wheeler Reflector Company. Lamp receptacle and socket section—R. W. MacNaughton, Harvey Hubbell, Inc. Manufactured electrical mica section—Thomas Allen, Macallen Company. Mining and industrial locomotive section—C. T. Miles, General Electric Company.

Molded insulation section—L. G. Sylvester, American Record Corporation. Motor and generator section—G. L. Waters, Wagner Electric Company. Overhead trolley line materials section—J. C. Wilson, Ohio Brass Company. Signaling apparatus section—Matthew Porosky, Holtzer-Cabot Electric Company.

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Swope Discusses Unemployment Before Science Academy

THE responsibility resting on industrial leaders in the United States of providing economic security for workers in the present crisis was emphasized by Gerard Swope, president of the General Electric Company, this week. The occasion was an address before a conference of business executives, economists, labor leaders, social workers and others held in Philadelphia under the auspices of the American Academy of Political and Social Science.

"Five years ago," said Mr. Swope, "when I suggested an unemployment insurance plan to the workers of the General Electric Company, the country was prospering and they were not interested. Four months ago I again suggested a plan and they were all interested.

"On December 1 we declared this plan in effect on an emergency call and we have a tremendous sum on which the workers may draw when needed. All contribute 1 per cent of their earnings to this emergency type of insurance."

Mr. Swope elaborated in some detail on this new General Electric plan. Every employee, from president to office boy, who is at work at least half time is already contributing 1 per cent of his wages to the new plan. The company contributes an equivalent amount. While the general plan was advanced to December 1 to meet the present emergency, it was decided to limit payments to $15 a week to employees needing assistance. The case of employees who may not have contributed to the plan but who are in need of assistance is considered.

Unemployment insurance, old-age pensions and co-operative programs by employers and employees, discussed by other speakers at the Philadelphia meeting, were termed by Mr. Swope the eventual means by which the problem will be solved.

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Opposes Requirement of Drawings with Bids

OPPOSITION TO THE PRACTICE of requiring detailed working drawings with bids on electrical equipment or as an element of contract was expressed in a resolution adopted November 21 by the executive committee of the National Electrical Manufacturers' Association. The resolution is as follows:

Whereas the practice of requiring detailed working drawings with bids or as an element of contract is objectionable and works a hardship on the manufacturer in that there is involved not merely unnecessary expense, but the demand for information and data which are the result of knowledge and experience, and are major elements of the bidder's "stock in trade"; therefore, be it

RESOLVED—That the National Electrical Manufacturers' Association hereby records its formal opposition to the practice.

This opposition does not apply to

such outline drawings of apparatus showing over-all dimensions, assembly drawings of major components, wiring diagrams, performance data and other diagrams, charts, photographs and instructions as are needed for installation, operation and maintenance purposes.

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Campaign on Use of Electric Trucks

THE ELECTRIC TRUCK COMMITTEE of the Commercial Section, National Electric Light Association, under its chairman, Charles R. Skinner, Jr., has had prepared for use by member companies a direct mail campaign on the use of electric street trucks in various industries and by various companies in the larger cities of the country.

Dana H. Howard, chairman of the publicity committee of the electric truck committee, N.E.L.A., and who for many years has been associated with the Commonwealth Edison Company in Chicago as superintendent of the advertising department, has been responsible for the creation of this campaign, which will actively start the first part of the year 1931.

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Kelvinator Corporation Makes Gain in Profits

A NET PROFIT of $1,601,016 as of September 30, 1930, an increase of 31 per cent over 1929, has been reported by Kelvinator Corporation. This represents a profit of $1.35 per share on 1,182,136 shares outstanding, as compared with $1,221,383 for the previous fiscal year, or $1.02 per share on the 1,179,859 shares then outstanding.

Commenting upon the statement, George W. Mason, president of the Kelvinator Corporation, said: "This remarkable net profits increase over the banner year of 1929 in a year that has been regarded as extremely poor is an indication of the fundamental soundness of American business and is further evidence of the fact that there was no loss of actual wealth in the shrinkage of inflated securities during the past year. Real prosperity is a prosperity of production and distribution, not of paper values.

"This increased profit was after deductions for charges against operations for the fiscal year had been made covering all tool and die charges and experimental work involving the expenditure of $463,841. In addition the heavy expense of introducing the new Yukon line of Kelvinators and the new line of Leonard electrical refrigerators was charged off."

Herr Sees Business Recovery in Sight

THERE ARE MANY REASONS for feeling certain that good progress will be made in business of all kinds before many months have passed, E. M. Herr, vice-chairman Westinghouse Electric & Manufacturing Company, told the Mid-day Club at Springfield, Ill., last week.

"With a splendid record of industrial progress just behind us," Mr. Herr said, "with our banks and other financial institutions in a very strong position, with the largest supply of gold in the world, with our inventories at a low figure, and with our credit and transportation facilities in splendid condition for efficient service, no one can doubt that the present depression in business will soon be over and that still greater progress is before us.

"Those of us who have been for many years active in business have passed through similar periods of depression and know that they do come to an end and are followed by good times. Because of our progress, such periods are less severe and destructive than they formerly were and tend also to be of short duration."

TRADE BRIEFS

The formation of a light metals group, with the Aluminum Company of America as the first member, is announced by the American Standards Association. This group becomes the forty-fifth member body of the association with representation on the A.S.A. standards council.

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J. G. Pomeroy Company of Seattle, San Francisco and Los Angeles, has been appointed, effective December 1, to represent Pass & Seymour, Inc., Syracuse, N. Y., manufacturer of porcelain and electrical supplies, in the states of California, Nevada and Arizona.

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General Electric Company announces the appointment of George S. West, formerly Pacific Coast zone manager for the merchandise department, to the position of Pacific Coast manager of appliance sales, having jurisdiction over the sale of all appliances in the Pacific Coast and Intermountain territory, with headquarters in San Francisco.

Unfilled orders of Allis-Chalmers Manufacuring Company on November 30 showed a sligh gain over a year ago, the total being $14,258,000, against $13,533,000 for November 30, 1929.

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Lombard Smith Company, Los Angeles, Calif., has been appointed southern California representative for the Geneva Manufacturing Company, Sainte Genevieve, Mo., manufacturer of a fan-type portable air heater.

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Further Increase in British Current Generation

THE OFFICIAL RETURNS just made to the British Electricity Commissioners reveal that 963,000,000 kw.-hr. of current was generated in the United Kingdom during the month of October, 1930, as compared with 949,000,000 kw.-hr. in the corresponding month of 1929, or an increase of about 1.5 per cent. During the ten months of 1930, up to the end of October, the total amount of electricity generated by authorized undertakers was 8,684,000,000 kw.-hr., in comparison with 8,240,000,000 kw.-hr. for the corresponding period of 1929, constituting an increase of about 5.4 per cent.

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Export Copper Price Off Again

LITTLE OCCURRED during the last week to change the complexion of the copper market until Tuesday, when Copper Exporters, Inc., announced a reduction in the export price from 12.30 cents to the basis of 11.30 cents, c.i.f. usual European ports. This action was taken to bring the export quotation in line with the domestic price named by custom smelters.

Leading producers have not altered their stand and the decline in the export price means no more than their withdrawal from the market under present unsettled conditions.

	Dec. 3, 1930 Cents per Pound	Dec. 10, 1930 Cents per Pound
Copper, electrolytic	11¼	10¾–11
Lead, Am. S. & R. price	5.10	5.10
Antimony	7.10	7.10
Nickel, ingot	35	35
Zinc, spots	4.07½	4.15–4.20
Tin, straits	25¼	25.10
Aluminum, 99 per cent.	23.30	23.30

A petition signed by about 2,500 citizens of Arizona asking Congress to provide tariff protection on copper was presented to the Senate this week. Copper is now on the free list and there is considerable agitation to make it dutiable.

Market Conditions

PACIFIC Coast business runs from 10 to 17 per cent below last year's. Government orders continue satisfactory and staple business has recovered somewhat during the past two or three weeks. Holiday trade is still slow in developing. Central-station business is quiet in New England. Inquiries for turbo-generators is a feature.

——BUYING IN THE EASTERN DISTRICT has turned definitely upward and inquiries have increased substantially.

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EASTERN

—BUYING HAS TAKEN *an upward turn in the Eastern district and inquiries are developing a stronger tone than for several weeks past. According to a national manufacturer of heavy and light electrical machinery, conditions in the equipment market are improving and there is more inclination on the part of central stations and industrials to place orders.*

—AN APPRECIABLE AMOUNT *of heavy equipment business is looming ahead, with expanding activities in the railway and marine fields scheduled in* 1931; *the first noted is arranging some sizable budgets for the New Year.*

Government work has become an important feature of current market operations and some heavy commitments are anticipated during the next 30 to 60 days. The Westinghouse Electric & Manufacturing Company has secured an award for electrical equipment for a Coast Guard cutter which will be built at the yard of the United Dry Docks, Inc., including one 2,600-kw. main turbo-generator set and one 3,220-hp. main propelling motor. A metropolitan central station has placed an order with a New York manufacturer for a quantity of network protectors to an amount of $200,000.

Electric refrigerators are arousing an increasing amount of interest and leading manufacturers are operating on capacity schedules. The General Electric Company is giving employment to about 7,000 persons at three of its plants devoted to this line. The Westinghouse Electric & Manufacturing Company, likewise, is running full for this account and is arranging a sales expansion program in different territories.

Leading manufacturers in New England, New York and Pennsylvania are operating on close to normal schedules for this production. The New York Edison Company reports sales in this line as 40 per cent in advance of 1929; business of the Public Service Electric & Gas Company in New Jersey shows a slight decline up to the present time.

CONSTRUCTION PROJECTS

Sinclair Refining Company, New York, will carry out an expansion program at oil refinery at Sinco, near Houston, Tex., to cost about $4,000,000. RKO Studios, Inc., New York, has plans for a film plant at Hollywood, Calif., to cost $750,000. Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until December 19 for one high-voltage testing transformer for the Brooklyn, N. Y., navy yard (Schedule 4682). Niagara, Lockport & Ontario Power Company, Buffalo, N. Y., plans transmission line from Sherman to Clymer, N. Y. Campbell Soup Company, Camden, N. J., plans canning plant at Toronto, Ont., to cost about $1,000,000. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., plans expansion and improvement program at works at South Philadelphia, Pa., to cost $300,000. Edison Light & Power Company and York Railways Company, York, Pa., affiliated, plan expansion program in power plants, transmission and distributing lines to cost about $600,000. National Transit Pump & Machine Company, Oil City, Pa., plans addition to cost $400,000. Warner Company, Wilmington, Del., plans extensions in sand, gravel, and mixed concrete plants to cost $750,000. Bureau of Yards and Docks, Navy Department, Washington, D. C., is reported planning expansion program at naval air station at Pensacola, Fla., to cost $400,000. Board of District Commissioners, Washington, D. C., will receive bids until December 17 for parts for lamp posts for use in electrical department, as per specifications on file.

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SOUTHWEST

—SEVERAL MANUFACTURERS REPORT *a large number of very small orders for stock sizes of motors and transformers. Another estimates the demand for holiday goods in appliances to be 50 per cent of normal.*

A considerable number of medium-sized jobs are being figured. Contracts reported include transformers and other electrical equipment for the new Missouri reformatory amounting to $50,000, a centrifugal air compressor for scavenging a large two-cycle oil engine, $9,000, and street-lighting installation for a southern city, $15,000.

CONSTRUCTION PROJECTS

Washington University, St. Louis, Mo., plans architectural school to cost $300,000. Springfield Tablet Manufacturing Company, Springfield, Mo., plans addition to paper plant to cost over $60,000. Phillips Pipe Line Company, Bartlesville, Okla., plans oil storage and distributing plant at Kansas City, Kan., to cost over $500,000. Reagan Brick & Tile Company, Oklahoma City, Okla., plans plant to cost $200,000. Mid-Kansas Oil Company, Bristow, Okla., plans extensions and improvements in oil refinery to cost over $150,000. Texas-Louisiana Power Company, Fort Worth, Tex., plans extensions and improvements in power substations and transmission lines in vicinity of Ranger, Tex., to cost $200,000.

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MIDDLE WEST

—GENERAL BUSINESS IN *the Middle West section continues to show improvement. While this improvement is necessarily slow, and difficult to observe, there is an undercurrent of optimism and it is quite universally felt that conditions are "looking up." The unemployment situation is receiving some direct attention.*

The automotive industry is in better shape; the railroads are employing more men in their repair shops and the large mail order houses report an increase in buying. The retail stores are receiving the benefit of holiday purchasing; the steel industry is at least maintaining its position and the various utility companies are busily engaged in construction and expansion plans. Altogether it seems that some much-needed concerted action is being taken to revive general business. There has been a limited demand for apparatus and equipment, although a considerable amount of maintenance purchasing and rehabilitation work is going on. Among the interesting orders placed this week were the following items: Water screens to cost $60,000, spare boiler parts to cost $15,000, four carloads of creosoted yellow pine poles, and "Mazda" lamps valued at $150,000.

CONSTRUCTION PROJECTS

Manitowoc, Wis., plans vocational school to cost $200,000. Detroit Edison Company, Detroit, Mich., plans extensions in transmission lines between Monroe and Brownstown, and will carry out other expansion in properties and power plants to cost $13,000,000. Quartermaster Corps, Fort Benjamin Harrison, Ind., will receive bids until December 22 for switches, fuses, meters, cable and other electrical supplies (Circular 27). Champion Coated Paper Company, Hamilton, Ohio, is reported planning mill near Mobile, Ala., to cost $1,500,000.

Telling-Belle-Vernon Company, Cleveland, Ohio, plans milk products plant to cost $160,000. Northern States Power Company, Minneapolis, Minn., will make extensions and improvements in transmission lines at Sabin, Minn., and vicinity. Austin, Minn., has authorized an ornamental lighting system. Southern Nebraska Power Company, Abilene, Kan., will build a power plant at Clay Center, Neb. Iowa-Nebraska Light & Power Company, Lincoln, Neb., has approved plans for power substation at Beatrice, Neb.

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PACIFIC COAST

—AN ELEVEN-MONTH SURVEY *of Coast electrical business shows that the San Francisco and Portland areas are 10 per cent below last year, while the Los Angeles and Seattle districts, influenced by oil and lumber depression, respectively, are minus 17 per cent.*

—THE PERSONNEL OF *representative contractors, wholesalers and electrical industrials, however, has decreased only about 5 per cent and all have noted a slight upward swing of staple business during the past month, though holiday sales are still disappointingly slow.*

Government business continues good, including electric refrigerators, radio transporting apparatus, instruments and staple wiring supplies in good quantities and largely for Mare Island. Railroad business has tapered off as the year draws to an end, but efforts are being made to advance cable orders now while markets are low. Building construction announced the lowest for the year, but includes such liberal items as a $1,000,000 hospital project for Los Angeles, an enlargement of the Gridley city plant, a $32,000 school electrical award for San Francisco, a $750,000 ice plant for Sacramento and about twelve revolving beacons for the Los Angeles-San Diego flight, with radio directional beacons and airport boundary lights for the terminals. Prices have decreased slightly for copper wires following the recent sharp advance, but prices at the end of the year are otherwise but slightly below those of January. Outstanding orders cover a $30,000 Westinghouse cubicle transformer for Pittsburg, Calif., and two General Electric regulators for Lodi, valued at $5,000. About $2,500,000 worth of electrical machinery is pending in central California, but very little is expected to be placed before January.

Christmas sales, jobbers to dealers, said to be 50 per cent less than last year, with standard-priced merchandise receiving very little attention from public. Dealers' stocks are very low and not moving. General contract bids for construction of a $3,000,000 assembly plant in Seattle for the Ford Motor Company were opened in Detroit December 16, with construction assured by first of year. Electrical buying for the plant, it is stated, will involve about $300,000, equally divided between motors, pipe, wire, conduit, transformers, circuit breakers and miscellaneous equipment. Contract for the construction of foundations for a power house for Diablo power plant on Skagit River, held up for past two weeks, has been given to Ward Construction Company, low bidder, involving about $250,000, and the Board of Public Works is now taking bids for furnishing and erecting a 300-ton, two-trolley traveling crane for power house, costing about $100,000.

CONSTRUCTION PROJECTS

Oliver United Filters, Inc., Oakland, Calif., will soon take bids for a plant to cost about $500,000. Associated Oil Company, San Francisco, Calif., has approved plans for additions to oil refining plant at Avon, to cost about $2,000,000. Pacific Gas & Electric Company, San Francisco, Calif., has plans for power substation, equipment service and distributing plant at Santa Rosa, Calif., to cost $65,000. Alameda, Calif., plans ornamental lighting system to cost $119,000. San Joaquin Light & Power Corporation, Fresno, Calif., plans steel tower transmission line to connection with system of Pacific Gas & Electric Company at Bellota, about 100 miles, to cost $2,000,000. Portland, Ore., contemplates hydro-electric power plants to approximate 175,000 hp. capacity. Puget Sound Power & Light Company, Seattle, Wash., plans 110,000-volt power line in vicinity of Everett, Wash. Mount Pleasant, Utah, will soon take bids for a power plant. Public Service Company of Colorado, Denver, plans extensions in transmission and distributing lines to cost $1,000,000.

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NEW ENGLAND

—LITTLE CHANGE IN THE TREND of *sales of electrical equipment during the past week is reported in this district. Power equipment, including small motors and switch and control equipment, is moving well and orders for power apparatus for marine service are holding up well.*

Negotiations for heavy machinery are confined mainly to inquiries for turbogenerators, including one of 35,000 kw. capacity for an eastern Massachusetts power plant. Central-station equipment is meeting with little demand; plans for service line extensions, on the other hand, are beginning to appear. In western Massachusetts one company will expend about $40,000 for line extensions. Activity in industrial electric heating has been set back somewhat in this district due to the curtailment of industrial expansion of metal-working plants, but orders for accessories for furnaces and control equipment, according to one manufacturer, are being received in good volume. Interior electric lighting is receiving attention. Requirements exceeding $50,000, including wiring, were recently placed for a new building project. Two interesting intercommunication apparatus orders for electrically operated signals were placed with a prominent manufacturer.

CONSTRUCTION PROJECTS

Edison Electric Illuminating Company, Boston, Mass., plans addition to power plant to cost $1,000,000. Universal Winding Company, Auburn, R. I., has filed plans for addition to textile machinery plant to cost about $50,000. New England Terminal Company, Providence, R. I., plans oil storage and distributing plant at Tiverton, R. I., to cost over $100,000.

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SOUTHEAST

—ELECTRICAL BUSINESS IN GENERAL *in the Southeast remains very quiet, but there were a few interesting items reported last week.*

The Federal prison at Atlanta is buying 1,000 hp. in motors and will within the next two or three weeks let a wiring contract on a textile mill addition involving $18,000 in wiring materials. Wiring contract was let on the Citizens and Southern Building in Atlanta and initial wiring material order amounted to $4,000. A satisfactory additional amount of materials will be shortly ordered on this job. A Georgia power company let orders for transformers, oil circuit breakers and lightning arresters aggregating $25,000 for one substation installation. Some other central-station orders were for $8,300 worth of aluminum wire, $7,230 worth of transformer equipment, $4,500 worth of junction boxes, $1,500 for a panelboard and $1,000 worth of creosoted pine poles. Activities among industrials are quiet. The only order of any size reported last week was from the coal and iron interests in Tennessee for $5,000 worth of motors and control equipment.

CONSTRUCTION PROJECTS

Virginia Wood Preserving Corporation, Washington, D. C., plans plant near Richmond, Va., to cost $250,000. Old Dominion Power Company, Norton, Va., plans addition to power substation at St. Charles, Va. Tennessee Corporation, Copper Hill, Tenn., plans extensions and improvements in copper and chemical plants, to cost over $1,000,000. Archer Hosiery Mills, Columbus, Ga., plans additions to mill to cost over $100,000. Scripto Manufacturing Company, Atlanta, Ga., plans addition to pencil factory to cost $100,000. Alabama Educational Foundation, Birmingham, Ala., plans industrial school to cost over $2,000,000.

New Equipment Available

Reversing Starters for Induction Motors

REVERSING, ACROSS-THE-LINE, air motor starters for the control and protection of squirrel-cage induction motors are announced by the Condit Electrical Manufacturing Corporation, Boston, Mass. These starters, known as type A-30-R, consist of two of the type A-30 arc-prevention motor starters mounted in a sturdy inclosing case and mechanically interlocked, so that only one starter can be in closed position at one time.

Both starters are equipped with thermal relays for time-lag overload protection. The type A-30-R starters are furnished with push-button control up to 20 hp., 550 and 440 volts; 15 hp., 220 volts; 7½ hp., 110 volts.

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Synchronous Motors with High Efficiency

SYNCHRONOUS COMMUTATOR MOTORS which are said to operate with unusually high efficiency and power factor and to use a low starting current are being manufactured by the Electric Specialty Company, Stamford, Conn. The performance of these motors is in compliance with the recommendation of the joint committee on fractional-horsepower motors, according to the manufacturer.

The saving in power in one year resulting from the use of these motors may more than compensate for the initial cost of the motor, according to the contention of the producer.

These machines, by Esco, are made in sizes ranging from ⅛ to 3 hp.

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Immersion Heaters with Large Surface Area

ELECTRIC HEATING ELEMENTS of the immersion type which are said to have the correct relationship between the area of the heating element and that of the outside casing, a factor which is claimed to reduce the high mortality for heating elements, are announced by the Harold E. Trent Company, Philadelphia, Pa. The refractories of these heating units have high dielectric and high temperature characteristics, according to the manufacturer.

These heating elements are so constructed as to be interchangeable with other heating elements of a similar character. They are made with a seamless brass tube for stock purposes, but bodies made of copper, steel or chrome-steel-alloy tubes are available.

For the standard element, heat is distributed over the entire length of the unit, but, when necessary, heat concentration at different points along the tube can be provided.

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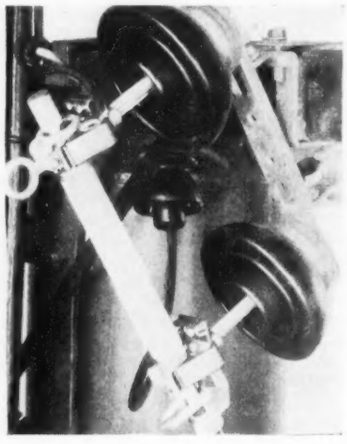
Open Expulsion Cutouts for 15-Kv. Rural Service

OPEN-TYPE EXPULSION CUTOUTS for rural distribution circuits of 15,000 volts and below have been developed by the



General Electric Company, Schenectady, N. Y. These cutouts are available in two ratings, one having a maximum circuit-voltage rating of 7,500/12,500-Y, the Y voltage being for systems with grounded neutral, and the other a maximum circuit-voltage rating of 15,000. Both have an interrupting capacity of 1,200 amp., r.m.s., at 60 cycles, a fuse rating of 1 to 60 amp. and a disconnecting-blade rating of 75 amp.

The design of the new cutouts is simple. Each consists of a fuse holder mounted in two sets of contacts supported by two insulators bolted to a hanger. In installation no tie insulator is needed on the lower crossarm. The fuse holder can be removed and replaced with a standard switch hook.

The 7,500/12,500-Y-volt cutout has a wet and dry flashover rating of 35 and 60 kv., respectively; for the 15,000-volt cutout these values are 45 and 75 kv.

Special Transformers Fit Inside Meter Box

SPECIAL TRANSFORMERS which will fit inside a standard meter box have been developed for 110-volt, 50- to 60-cycle watt-hour meters operating on all types of circuits by the American Transformer Company, Newark, N. J. These units are known as "AmerTran" type MB and are available for operating standard watt-hour meters on 220-, 440- or 550-volt circuits. All types have an electrical rating of 40 va. and are designed for continuous duty in 50- to 60-cycle circuits.

"AmerTran" type MB is of open-end-frame construction and the terminals are of flexible, cambric-covered wire. It requires a wall space of 4⅛x3½ in., and is equipped with four conveniently located mounting lugs spaced 2½ in. apart. In standard models four wires are brought out from the primary winding to permit operation on either 220- or 440-volt circuits. Transformers for service in 550-volt circuits are assembled promptly on special order.

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Heavy-Duty Battery with Higher Capacity

HEAVY-DUTY STORAGE BATTERIES having 50 per cent greater capacity than the present Edison nickel iron alkaline battery are announced by the Edison Storage Battery Company, Orange, N. J. This new battery, designated type C, is said to have the characteristics of long life, dependability and durability claimed for the type A battery already on the market.

To users of storage batteries for heavy-duty service the new type C battery offers 50 per cent greater available current than the type A battery in the same square dimensions of battery compartment space.

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Underground Cable Racks

UNDERGROUND CABLE RACKS with insulator supports which may be detached from the upright simply by lifting the detachable step approximately ¼ in. upward and pulling it outward are announced by the Electrical Utilities Service Company, Inc., Allentown, Pa. When this device is used in an underground cable installation it is not necessary to remove the cables which are above a section that is to be removed.

The device consists simply of the upright, the detachable insulator support and concave insulators.